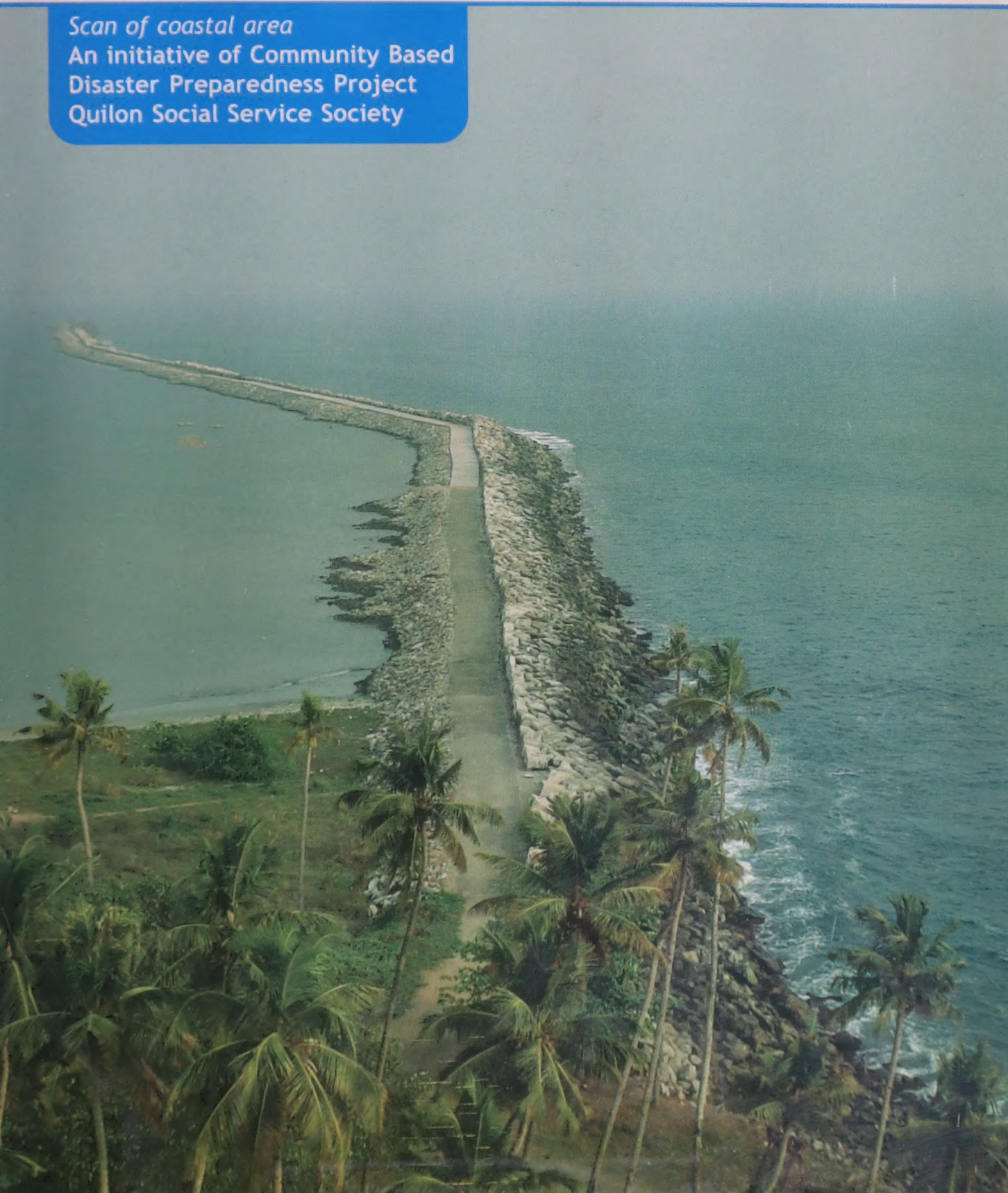


DISASTER PRONE AREA SURVEY OF KOLLAM DISTRICT

Scan of coastal area

An initiative of Community Based
Disaster Preparedness Project
Quilon Social Service Society





"Meanwhile Noah sent out a dove to see if the water had gone down, but since the water still covered all the land, the dove did not find a place to alight. It flew back to the boat, and Noah reached out and took it in. He waited another seven days and sent out the dove again. It returned to him in the evening with a fresh olive leaf in its beak. So Noah knew water had gone down. Then he waited another seven days and sent out the dove once more; this time it did not come back"

(Genesis. 8:8-12)

Community Based Disaster Preparedness Project *an overview ...*

A focus on resilience means putting greater emphasis on what communities can do for themselves and how to strengthen their capacities, rather than concentrating on their vulnerability to disaster or their needs in an emergency. A disaster resilient or disaster resistant community is the safest possible community that we have the knowledge to design and build in a natural hazard context, minimizing its vulnerability by maximizing the application of disaster risk reduction measures. DRR is therefore the collection of actions, or process, undertaken towards achieving resilience.

Caritas India has initiated a community based disaster preparedness programme in five coastal districts of kerala. Quilon Social Service Society has the responsibility of implementing this programme in India in this programme to empower

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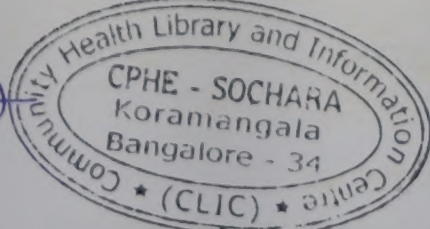
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An initiative of
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Quilon Social Service Society

Abbreviations

DPA	- Disaster Prone Area
CBDP	- Community Based Disaster Preparedness
DRR	- Disaster Risk Reduction
CRZ	- Coastal Regulatory Zone
TRP	- Tsunami Rehabilitation Programme
MSSRF	- M S Swaminathan Research Foundation
CESS	- Centre for Earth Science Studies
T S Canal	- Trivandrum Shornur Canal
PRI	- Panchayath Raj Institutions
LSG	- Local Self Government
RCC	- Reinforced Cement Concrete
GP	- Gram Panchayath
PRA	- Participatory Learning and Action
HIV	- Human Immune Virus
KWA	- Kerala Water Authority
SC/ST	- Scheduled Caste/Scheduled Tribe
LC	- Latin Catholic
CBO	- Community Based Organisations
NGO	- Non Governmental Organisations
ERT	- Emergency Response Teams
VCP	- Village Contingency Plan
IDNDR	- International Decade for Natural Disaster Reduction
UNEP	- United Nations Environment Programme
OECD	- Organisation of Economic Cooperation and Development
IUCN	- International Union for conservation of Nature and Natural Resources
DMT	- Disaster Management Team
ICZM	- Integrated Coastal Zone Management
FSI	- Forest Survey of India
UNCLOS	- United Nations Conservation on the Law on the Sea
MoEF	- Ministry of Environment and Forests
SDMA	- State Disaster Management Authority
CMFRI	- Central Marine Fisheries Research Institute
IRE	- Indian Rare Earth

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History is the story of those who survived calamities. Noah and his family who bravely encountered the floods and preserved life and wealth, are the inspiring symbols of the indefatigable and invincible human spirit that survives all threats to existence.

Nature is mother. She is love. Yet the dangers and devastations that Nature occasionally brings on humanity are ruthless and terrifying. Man, who has conquered the moon, stands in helplessness without dominion over Nature.

Devastation bestowed by the tsunami of 26 December 2004 was unprecedented and challenged our beliefs and myths about life on earth.

Quilon Social Service Society was able to turn the story of pain into a story of hope through a series of interventions in a Tsunami ravaged land. We have moved without relapse from relief activities to reconstruction and now have dived into a new intervention of resilience building. Empowering the people in disaster prone area to meet disaster is indeed an uphill task. We have been able to mobilize people torn apart by disaster towards sustainable development with the inbuilt capacity to manage disaster.

Notable progress has been made in disaster preparedness in different parts of the world and we are in the process of gathering the good practices and blending them with the collective wisdom of our own people in this regard.

In our reference area high tide and consequent disasters come in as a series and it is now opportune to analyze the disasters, identify the causes, look towards available contingency plans in terms not only of mitigation but also in terms of prediction and risk reduction.

We are challenged to turn Disaster preparedness into a people's movement with the participation of all stakeholders - the Govt., the common man and voluntary agencies. Isolated ventures are bound to provide limited results but co ordinated ventures with long term vision and integrated approach will reap results- a hundred fold.

As part of our Disaster Management Program we have completed a comprehensive survey of the Disaster prone areas in Kollam District. We are happy to submit the findings of this survey to the State Govt., the Kollam Corporation and Grama Panchayaths covered by the project and our funding partners. We do hope this survey will enable us to design the road map for our interventions ahead. We are conscious of our call to join the global concern to protect mother earth and commit ourselves to be in the vanguard to prepare humanity to survive disasters.

The State Govt. is processing a massive re-location program in the coastal belt. The challenge of protecting the coast from further erosion has to be addressed in the context of vulnerability reduction with all the gravity that it deserves. The possibility of raising a bio shield in the area that will be evacuated of families who will possibly be relocated with dignity is yet another challenge.

Quilon Social Service Society with a track record of having walked with the coastal people of Kollam for almost half a century renews its commitment to transform a situation of despair into an opportunity of ushering in a marginalized group to a new tomorrow of dignified existence. The Community Based Disaster Preparedness Program' QSSS is implementing in the focus area is a major step to build a resilient community. Along with the many supporting agencies of QSSS I salute all the men and children living in the lap of disaster and invite them to cry aloud

"We shall overcome"

Fr. Romance Antony
Director, QSSS
Kollam

1. Down the labyrinth (natural disasters scan)

It is after mutations and metamorphosis that the universe has come to the present form and appearance. The truth is that many species that existed before the emergence of man into the universe are now extinct. The evolutionary principle- "survival of the fittest" is nature's law that can never be negated. The species, that could not survive natural catastrophes like floods and earthquakes, have vanished from the earth. The flood in the times of Noah might have been just one among the many disasters that had occurred in the ancient times.

Natural disasters have wiped out from the face of the earth millions of human beings. More have been killed in wars, communal riots and genocides unleashed by dictators. As for epidemics in the first phase of the last century five crores of human beings were wiped out by Spanish Fever alone.

Humanity faces two types of disasters

Natural disasters	Human made disasters
Flood	Communal and ethnic riots
Cyclone	War
Earthquake	Epidemics
Drought	Industrial disaster
Tsunami	Fire
Landslide	Terrorism
Cold Wave	Hutch tragedies
Avalanche	Acid Rain
Tornadoes	Chemical Pollution
Hailstorm	
Heat wave	

2. Some of the devastating calamities recorded in the history of humanity¹

Place	Year	Disaster	Loss of life
Athens	430 B.C.	Typhus epidemic	
Pompei	79 B.C	Volcanic eruption	
Antioch, Syria	526	Earthquake	250,000
Constantinople	542	Bubonic plague	
Beirut , Lebanon	551	Earthquake and tsunami	Tens of thousands
Japan	1181	Famine	100,000
Holland	1228	Sea flood	100,000
Chihli, China	1290	Earthquake	100,000
Europe and Asia	1346-52	Bubonic plague or "black death"	One third of the European population dead plus millions in Asia and North Africa for a total of 25 million
Shensi, China	1556	Earthquake	800,000
Napoli, Italy	1631	Mt Vesuvius erupts	3000
Havana	1648	Yellow fever epidemic	
Sevilla, Spain	1649	Plague	80,000
Turkey	1668	Earthquake	8000
Hokkaido	1730	Earthquake	140,000
Calcutta	1737	Earthquake	300,000
Lisbon	1755	Earthquake and tsunami	30,000
Bengal, India	1769	Famine	10 million
India	1775	Tsunami	60,000
North America	1775-82	Smallpox	130,000
Iran	1780	Earthquake	200,000
Caribbean's	1780	Hurricane	22,000
Philadelphia	1793	Yellow fever epidemic	5000
Sumbawa, Indonesia	1815	Mt Tambora erupts	88000
Japan	1826	Tsunami	27000
Cairo	1831	Cholera epidemic, which spreads to London	
London and Paris	1832	Cholera epidemic	25000
Ireland	1845	Famine	One million

¹ The worst Natural Disasters ever by Pierro Scoruffi

Place	Year	Disaster	Loss of life
Mapoli, Italy	1857	Earthquake	11000
India	1864	Cyclone	70000
France	1870-71	Smallpox	500,000
Bangladesh	1876	Cyclone	200,000
China	1876-78	Drought	9 million
China	1881	Typhoon	300,000
Indonesia	1883	Tsunami	36,000
Hyayan Kou, China	1887	Yang-ste Kaing flooding	One million
Mino-owari, Japan	1891	Earthquake	7000
Sanriku, Japan	1896	Tsunami	27000
India	1897	Earthquake	1500
Galveston	1900	Hurricane	8000
Martinique	1902	Volcano	38000
San Francisco	1906	Earthquake and fire	3000
Colombia	1906	Earthquake	1000
Chile	1906	Earthquake	20,000
China	1907	Famine	20 million
Messina , Italy	1908	Earthquake	70000
Mexico city	1911	Earthquake	
Worldwide	1918	Influenza pandemic	25-100 million
Gansu, China	1920	Earthquake	200,000
Ukraine	1921	Famine	5 million
Yokohama, Japan	1923	Earthquake	143,000
Nanshan, China	1927	Earthquake	200,000
China	1928	Famine	3 million
Florida, USA	1928	Hurricane	1800
China	1931	Flooding	3.7 million
Ukraine and Russia	1932	Famine	5 million
Gansu, China	1932	Earthquake	70,000
Sanriku, Japan	1933	Earthquake	3000
Bihar, India	1934	Earthquake	10700
Quetta, Pakistan	1935	Earthquake	60,000
China	1936	Famine	5 million
New York, USA	1938	Rains	600
Erzincan, Turkey	1939	Earthquake	33,000
China	1941	Famine	3 million
Bengal, India	1943	Famine	3.5 million
Tonankai, Japan	1944	Earthquake	1200
Nankaido, Japan	1946	Earthquake	1330
Ashgabat,			
Turkmenistan	1948	Earthquake	100,000
Assam, India	1950	Earthquake	1526
Holland	1953	Sea flood	1794
Iran	1953	Rain flood	10,000
Louisiana, USA	1957	Hurricane	400

Place	Year	Disaster	Loss of life
Worldwide	1957	Influenza pandemic	4 million
Japan	1985	Typhoon	5000
China	1958-61	Famine	38 million
Morocco	1960	Earthquake	10,000
Chile	1960	Earthquake	5700
Mt Huascaran, Peru	1962	Volcano eruption	3000
India	1965	Famine	1.5 million
Worldwide	1968	Influenza pandemic	750,000
China	1969	Famine	20 million
North Peru	1970	Earthquake	66,000
Bangladesh	1970	Sea flood	200-500,000
Vietnam	1971	Red river flood	100,000
Nicaragua	1972	Earthquake flood	10,000
Bangladesh	1974	Floods	28,000
Ethiopia	1974	Famine	200,000
Haicheng, China	1975	Earthquake	10,000
Tangshan, China	1976	Earthquake	750,000
Guatemala	1976	Earthquake	23,000
Andhra Pradesh, India	1977	Cyclone	10,000
Caribbean's	1979	Hurricane	2000
Mexico	1982	Volcanic eruption	1800
Yemen	1982	Earthquake	3000
Bhopal, India	1984	Chemical pollution	3800
Ethiopia	1984	Famine	900,000
Ciudad de Mexico	1985	Earthquake	9500
Colombia	1985	Volcano	25000
Armenia	1988	Earthquake	55,000
Colombia	1985	Eruption of Nevada del Ruiz	23,000
Bangladesh	1988	Monsoon flood	1,300
Gilan & Zanzan, Iran	1990	Earthquake	35,000
Bangladesh	1991	Tsunami	138,000
Latur, India	1993	Earthquake	22,000
Kobe, Japan	1995	Earthquake	5,500
Niger	1995	Meningitis outbreak	25000
Chicago, USA	1995	Heat wave	739
North Korea	1995-98	Famine and floods	3.5 million
West Africa	1996	Meningitis outbreak	25000
Tashkent, Uzbekistan	1996	Earthquake	
Papua New Guinea	1998	Tsunami	2200
Yangtze Kiang, China	1998	Hurricane Mitch and floods	12000
Afghanistan	1998	Earthquakes	10000
Colombia	1999	Earthquake	1185
Lzmit, turkey	1999	Earthquake	17000
Taiwan	1999	Earthquake	2400

Place	Year	Disaster	Loss of life
Orissa, India	1999	Cyclone	7600
Venezuela	1999	Floods	20000
Gujarat, India	2001	Earthquake	20000
El Salvador	2001	Earthquake	850
Afghanistan	2002	Earthquake	2500
Algeria	2003	Earthquake	2266
Asia	2003	SARS	744
Andhra Pradesh, India	2003	Heat wave	1300
France, Spain & Italy	2003	Heat wave	50000
Bam, Iran	2003	Earthquake	26300
Al-hoceima, Morocco	2004	Earthquake	571
Haiti& Dominican Republic	2004	Rains	2400
Philippines	2004	Typhoon	1000
China	2004	Flood	1300
Southeast Asia	2004	Earthquake	111,000 - Indonesia 31,000 - Sri Lanka 10,700 - India 5,400 - Thailand 68 - Malaysia 82 - Maldives 300 - Myanmar 150- Somalia 1500 - Scandinavian and dozens of Germans, Italians, Dutch etc.
Zarand, Iran	2005	Earthquake	500
Nias, Indonesia	2005	Earthquake	1000
Mumbai, India	2005	Monsoon	1000
China	2005	Floods	567
Louisiana & Mississippi, USA	2005	Katrina Hurricane	1464
Niger	2005	Famine	10000
Kashmir	2005	Earthquake	80500 (79000 Pakistan & 1350 in India)
Central America	2005	Floods	1400
Philippines	2006	Mud slides	1800
Java	2006	Earthquake	4300
Java	2006	Tsunami	520
India & Pakistan	2006	Floods	300
Southern Ethiopia	2006	Floods	800
Fujian, China	2006	Typhoon	260
Bihar India	2007	Flood	758

3. Man and Ocean

The oceans cover two-third of the earth. 70.8% of living beings have had their genesis in water. "The renewable living aquatic resources of the sea represent a unique gift of nature to humankind. Coral reefs are the aquatic counterparts of tropical rainforests in terms of richness of biological diversity"².

There are about 10000 volcanoes in the beds of the oceans. The average depth of the oceans is estimated to be 3730 meters. India has a coastline of about 7500 kms of which the mainland accounts for 4500 kms. The Lakshadives has a coastal line of 132 kilometers and Andaman Nicobar has a coastal line of 1900 kilometers. The Indian Ocean, the Arabian Sea and the Bay of Bengal enclose the coastal lines of India. The area covered by the Indian Ocean, the smallest among the oceans which extends from Africa to Australia, is 73440000 sq. kilometers. The length from Africa to Australia is only 10000 kilometers. The average depth of this ocean is 3890 meters. The area of the Arabian Sea is 2173000 sq. kilometers and its average depth is 2600 meters.

It is quite noteworthy that along the coastal belt of India within 50 kilometers 250 million people reside. "Because of the multiple benefits provided by the coastal environment for human health, wealth and well-being, demographic pressures on coastal resources started increasing during the last century. Extreme cases of intensive pressure of human population on coastal ecosystems are seen in Kerala, as well as in mega-cities like Mumbai. Over 25% of India's population live in coastal areas during this century. Many large cities and urban habitations are also near the seacoast."³

Percentage of population living along the coastal areas

USA	60%	Canada	25%
Netherlands	60%	Australia	75%
Spain	35%	Brazil	38%
Thailand	70%	Malaysia	70%
China	40%	Sri Lanka	34%
India	25%		

² M.S.
Swaminathan –
Report of the
committee to
review CRZN
Page 1
³ Ibid



4. Tsunami – The Strange Phenomenon

From time immemorial tsunami has strewn disasters in different parts of the world. The havoc wreaked by the tsunamis, ranging from the one that hit the Mediterranean coast in 15 B.C. to the one that thrashed Java in 2004, is immeasurably immense. But the repercussions of the tsunami that hit Sumatra in 2004 have given a drastic twist to the perception of man about nature and of human history itself...

The word tsunami has had its origin in the Japanese language and it means 'tidal waves at the port'. It is a string of surging waves. It has already been proved scientifically that perpendicular movement in the bed of the ocean cause tsunami. The earthquakes in the bed of the ocean, landslides, volcanic eruptions and the repercussions of the fall of meteors and asteroids into the ocean are other validated causes for tsunami.

These tidal waves, though not at great height, with great speed traverse many thousand kilometers through the oceans. Disasters may be strewn very far away from the epicenter of the earthquake. Between the time of the birth of a tsunami and the time it reaches the shore there will be difference of hours. This gives scope for preparedness measures to take position.

The earthquake in the ocean causes dislocation in the crust of the earth. The energy generated by this exerts very strong pressure on the water above. This pressure spreads out thousands of kilometers in the ocean. Almost all the tsunamis are originated by the earthquake tumult in the bed of the ocean. The occurrence of 124 major tsunami disasters between 1861 and 1948 has been recorded. Out of these, 63 were in the last twenty years.

There are thousands of volcanoes and coral reefs in the beds of the oceans. All the earthquakes do not result in tsunamis. If the frequency of the earthquake is low, the reverberation also will be low. In the coastal region of South America, though there have been 1090 earthquakes in a century, only twenty times tsunami has occurred.

The tsunami, which originated from the volcanic eruptions in the island of Dan Torimy in B.C. 1470, completely wiped out the towns on the coast of the East Mediterranean'. The available information is that the tsunami waves rose up to 90 meters.

Tsunamis born out of the fall of meteors into the oceans are said to be rare. It is said that dinosaurs became extinct before 60 million years because of a tsunami that resulted from the fall of meteors in Mexico and waves reached up to 200 kilometers into the interior of the land. It is said that in B.C. 2350 a comet that deviated from the solar system exploded and fell on the earth, causing the complete ruin of many ancient cities and Civilizations. After B.C.47 there have been 1274 tsunami disasters on the coast of the Pacific Ocean alone.

Tsunami struck china 4000 years ago and the In the Mediterranean before 2000 years back. The list of the tsunami disasters that befell the Mediterranean Sea is quite long. After B.C. 1300 there have been 300 tsunami disasters. It was on Dec. 28, 1908 that the most ruinous tsunami disaster befell the Mediterranean Sea. 60000 people were killed in this tsunami disaster. Tsunami is a common occurrence in South Carribea. The coastal regions of Chile and Peru have witnessed several tsunami disasters. Once in every 30 years a tsunami occurs here. The tsunami that hit Chile on May 22, 1960 was horrible. 1300 kilometer of the coast was submerged under water. 10000 people died. It was a tsunami that brought disaster to places 1000 kilometers away from the place of its origin.

Hilowa in Hawaii is another land that has witnessed many tsunami disasters. The tsunami disaster that befell Alaska on a Good Friday (Mar. 27, 1964) attracted the attention of the world. New Zealand and Australia are tsunami prone areas. In New Zealand 12 tsunami disasters and in Australia 43 tsunami disasters have been recorded. The tsunami that hit the Bay of Lituya and Alaska on July 9, 1958 was terrible. The waves, that rose to a height of 517 meters above the sea level and hit the shores on the other side, wiped out every thing. There have been tsunami disasters in the Sanmic Sea, Bulgarian Sea, Black Sea and Northern Turkey. It has been reported that there have been hundred tsunami disasters in the coastal area around Turkey." The Indian Subcontinent is an earthquake prone area but "Tsunami is a rare phenomenon in the Indian context particularly Kerala. However, natural disasters like, cyclone, storm surge, coastal floods, tidal waves, etc. are not uncommon in the coastal Tract (Baba 2005)"⁴. The tsunami that occurred in the Indian Ocean before the one in 2004 was on Aug. 27, 1883. It took away the life of 36000 people. This tsunami resulted from the volcanic eruption in Java Sumatra.

On Dec. 26, 2004 in the morning between 6.20 and 6.28 in the bed of the Indian Ocean near Sumatra in Indonesia there was an earthquake that was recorded in the Richter scale at 9.3. The resultant tsunami reached the coast of Kerala by noon. The tsunami that swept in to the coast of Kerala wrought indescribable havoc. Following are some of the observations of the study conducted by Centre for Earth Science Studies, Thiruvananthapuram on the impact of tsunami.

- "The Kerala coast is located in the shadow zone with respect to the direction of propagation of the tsunami, and in that sense its impact and severity was rather unexpected. The impact was so severe along the coastal region adjacent to the Kayamkulam inlet of Southern Kerala"⁵.
- "The run-up level distribution of tsunami shows wide variations along the coast. In the Pozhiyur to Vizhinjam (south of Trivandrum) sector, the run-up land was only upto 1.5 m, whereas in the Vizhinjam-Varkala sector (north of Trivandrum) it was 2-2.5 m. In the Thangasseri harbour area of the Quilon coast, the run-up was about 2.5 m., which rose gradually towards north, and on both sides of Kayamkulam inlet the run-up level was up to 5 m. The maximum devastation was on both sides of the Kayamkulam inlet covering parts of Alappad Panchayath to the south of the inlet and Arattupuzha Panchayat to its north. From Thottappally northwards there was a further decrease till south of Anthakaranazhi inlet. Around this Anthakaranazhi inlet, there was an increase in the run-up level reaching up to 3.5 m"⁶.

⁴ Baba M. (2005) Occurrence of swell waves along the South West Coast of India from southern Indian Ocean.
⁵ Final report on the "Impact of Tsunami on the Kerala Coast and an initiative for development of a Management plan for the region by Centre for Earth Science Studies Thiruvananthapuram- May 2004
Page 4
⁶ Ibid page 5

- "Further north in the Chellanum-Puthuvype region around Cochin, run-up level decreased to 3 m. However, in the Edavanakkad region, the run-up level increased drastically and went up to 4.5m. There was a reduction in the run-up level further north with a drastic reduction in the zone immediately north of the Munambam inlet. However, the level increased up to 3 m. around Vadanapally further north, from where the level started decreasing till south of the Ponnani inlet. Thereafter again there was an increase in the level to the north of Ponnani inlet. The run-up level up to 2.5 m. was found in Beypore inlet, south of Calicut"⁷.
- "The inundation due to the tsunami caused considerable flooding of the canal bordering barrier beaches. The flooding occurred either due to the entry of water that crossed over the shores or due to flushing through the tidal inlets. It is to be noted that the inundation brought deposits as thick as about a meter in the coastal roads of Kayamkulam inlet area"⁸.
- "The region stretching from Kollam to the entrance of the TS canal in the Ashtamudi estuary which had a depth varying between 2 and 3 m during pre-tsunami had reduced to 0.1 and 0.6 m after tsunami. The erosion is predominantly noticed between Chavara Bridge and further north near the Azheekal sector. Here the depth of the canal increased gradually from 2 m and reached a maximum of 5 m near Azheekal. The Azheekal - Srayikkad sector is the worst affected area in terms of human causality and loss of property. High amount of flood water has flowed to the canal along this stretch of the coast resulting in an increased depth of 0.5 to 1.0 m. The canal region north of Kayamkulam inlet, which has a depth between 2 and 4 m during pre tsunami period, has been reduced considerably"⁹.
- "Alappad part is a barrier island of 100m to 500m width bordered by 100m-150m wide lagoon and part of Arattupuzha is a long wide spit of 500m to 1000 m width. The northern part of Alappad Panchayath and southern part of Arattupuzha Panchayath were affected by tsunami. Tsunami waves flooded the area and the run up water returned to the sea through the lagoon and Kayamkulam inlet. Presence of the lagoon, in fact, relatively reduced the flood fury"¹⁰.

"Bathymetric changes in the inner shelf have been ascertained in the Tangassery - Arattupuzha stretch. Shifting of depth contours towards the shore indicating erosion of sediments and deepening of inner shelf due to Tsunami has been confirmed"¹¹.

★ ★ ★

⁷ Final report on the "Impact of Tsunami on the Kerala Coast and an initiative for development of a Management plan for the region by Centre for Earth Science Studies Thiruvananthapuram May 2004
 page 6

⁸ Ibid page 10
⁹ Ibid page 10-11

¹⁰ Ibid page 14
¹¹ Ibid page 8

5. The Balance Sheet of the Tsunami

KERALA

Death toll in Kerala - 171

Death toll outside Kerala - 32

Houses destroyed in the disaster - 17381

Number of those who sustained injuries - 8714

Number of fishing gears and boats destroyed and lost - 10882

KOLLAM DISTRICT

Death

Elders - 69

Children - 61

Total — 170

Source - District Information Office Kollam

ALLEPPEY DISTRICT

Arattupuzha - 29

Houses completely destroyed - 3328

Houses partly destroyed - 1592



6. The lessons that Tsunami taught

The people of Alappad will never forget that day when the sea very strangely receded. This was a spectacle of shocking novelty to the people, who earlier had seen the sea wrathfully encroaching the shore as if with a vengeance. This rare scene attracted many people some of whom walked down the exposed sea bed. The sea that receded soon rushed back with ferocity unheard of, transforming the shore into an adjoining sea. What followed thereafter has become part of history. The dailies next day depicted the waves that submerged the whole region in a deluge of tears, as **Monstrous Waves**. Later the word "tsunami" came into vogue. The misery that the wrathful waves strewed on the shore was unprecedented. The disaster caused by the monstrous waves, that resulted from the earthquake in the bed of the ocean, which had strength of 9.3 on the Richter scale, was the worst in recent history.

There was a deluge of consolation from all corners. The waves of consolation seemed to vie with and defeat the monstrous waves that strewed disaster on the shore. The Quilon Social Service Society, that started relief activities in Alappad on Dec. 26 itself, gradually and carefully designed and completed the rehabilitation projects and thus added its own chapters of creative consolation to the history of renovation in Alappad. The residents of Alappad are now coming back to life. Besides the residents of Alappad, all the residents of the coastal area of Kollam District have borne the brunt of the tsunami disaster. Their sense of security has been deeply affected. History has now entrusted us with the challenging responsibility of building resilience in the coastal communities devastated by Tsunami and those who live in disaster prone areas.

When the reverberations of the underwater earthquake that occurred in Sumatra about 4000 kilometers away, played havoc on the coastal area of Kollam, the lessons that we were compelled to learn were many, some of which we note below:

- i. Disaster is always at our threshold. ("In the very temple of delight veiled melancholy has her sovereign shrine" - John Keats)
- ii. The coastal region of Kerala, that has witnessed only small tidal encroachments, is in reality a disaster prone area. This realization compels us to study and adapt the measures taken in other countries to face such crisis.
- iii. There is no substitute for incessant vigilance.
- iv. Every society has to evolve its own strategy of disaster management from a level enlightened by the integration of science and traditional wisdom accrued from experiences.
- v. Community is the primary force that has to face the disaster. Government agencies and voluntary organizations just empower the people in the disaster prone area.

7. General Information

7.1 This survey is concerned about the increasing vulnerability of the coastal community of Kollam district who can be counted as part of one of the most marginalized groups in this country. "The coastal community is basically comprised of fishers. Although fishing is by far the riskiest occupation in the world and there are frequent accidental deaths (one in every four days during the last decade) in Kerala, the fishing communities had taken these losses in its stride as occupational hazards (Kurten, 2005). However, this tsunami event benumbed the entire fishing community. Due to social and economic backwardness, the capacity of this community to withstand such an unexpected tragedy is limited. In fact people were caught unawares and totally shaken"¹². "It is this dilemma that has to be addressed.

7.2 Twenty percent of the population of our country lives in 3638 fishing villages spread over in its 7500 km coastline. The details of fishermen population as per census 1991 is as follows.

Male	-	2,686,000
Female	-	1,980,000
Children	-	2,364,000
Total		6,730,000

7.3 The fishing population engaged in full time fishing is 738,000 and 713,000 in part time fishing. 689,000 people are engaged in allied and attached activities like marketing. While the great chunk of our fishing community can be classified as traditional, the high tech and capital oriented sector has taken over the sea. The total marine fish production is around 2.75 million tones in the 2251 fish landing centers in the country. The interesting fact is that 50% of the total fish catch is from near shore waters and harvested by traditional fishermen groups.

7.4 Kerala has a coastline of 590 kilometers with a very vulnerable situation. "India's coastline has been undergoing physical changes throughout the geological past, although the last tectonic in the Indian peninsula has been one of the general emergence, the present coastal geomorphology of India has evolved largely in the background of the post-glacial transgression over the pre-existing topography of the shore, coast and offshore zones. The Holocene sea fluctuated in the course of the last 6000 years and the marked regression is indicated between 3000 to 5000 years B.C"¹³

7.5 "Kerala coast is described as a sub-mergent coast. Lateritic cliffs, rocky promontories, offshore stalks, long beaches, estuaries, lagoons spits and bars are characteristics of Kerala coast. The sand ridges, extensive lagoons and barrier islands are indicative of a dynamic coast with transgression and regression in the recent geological past. The central Kerala coast around Kochi is of recent origin. There are about 700 land-locked islands (including barrier islands) in Kerala. The mud banks of Kerala are unique transient near shore features appearing during monsoon. Though there are 41 rivers bringing enormous quantity of sediments, deltas are not formed due to the high energy condition of the coast. Cochin-Vembanad is one of the largest estuarine systems in the

¹² Srikumar
Chattopadhyay
– Disaster
Management ;
Lessons learnt
from the
Tsunami, CESS
P.13
¹³ M.S.
Swaminathan
report, Page 7

country. Ashtamudy is another major estuary in Kerala. It is estimated that 30 kms of the coast is undergoing high erosion. Seawalls protect about 360 kms of the 570 kms coastline. There are rich heavy mineral deposits in Chavara. Though the Kerala coast is described as a mangrove forest in the resourced history, it is left with just 16 sq.kms of mangroves restricted mainly at Valapatanam and Puthuvaipu (Kochi)¹⁴ "

7.6 KOLLAM—ANCIENT PORT

Kollam along with Mussuri {Kodungalloor} was an ancient port on the Arabian coast and had trade relations with Phoenicians and Romans. St.Thomas one of the apostles of Jesus Christ landed in Kollam in A.D 52 and founded a Christian community {one of the seven Churches}. Travelogues of Panthenous the Philosopher /Theologian from Alexandria who visited Kollam in A.D. 180, Cosmos Indicaplamoose, the Bysentine Monk who visited Kollam in 520-525, Arabian travelers Suliman {A.D. 851 } and Iban Bathootha {517} mention about the flourishing port in Kollam .Worth mentioning is the description of Kollam port bt Venetian traveler Marco Polo who visited Kollam in A.D 1292. Christians from Syria started migrating to kerala through Kollam Port in fourth century A.D. In 1503 Portuguese took control of Kollam coast and built a fort in Tangasseri. The Dutch took over from the Portuguese in 1661 and continued to hold fort till 1741 when they were driven out by Marthanda Varma. In 1795 the British took over the great part of Kollam coast. Once a city of palaces, Kollam has been known to the outside world, by the time-honored proverb, "Once you have seen Kollam you would no more need your illam" (home).

7.7 Kollam district extends from latitude 8.54 N to 76.38 E

7.8 Major rivers in the district are Kallada and Ithikkara. Sasthamkotta Lake is a major fresh water lake in the state. Ashtamudy Kayal the second biggest lake in the state is the heartbeat of the district. Kallada River pours into Ashtamudy which merges with Arabian Sea at Neendakara estuary. Paravoor Kayal is yet another lake in the district which pours into the sea at Paravoor.

7.9 Over the centuries Kollam has shrunked as a small coast. Fishermen every day pass through the remnants of churches buried in the sea. The challenge before us is to protect what we have inherited and pass on to the next generation a safe coast.

7.10 Geographically the whole of the coastal region of Kollam district is a disaster prone area. On one side there is the Arabian Sea and on the other side there is a lake or a canal. The Ashtamudy Lake, Paravoor Lake, Vattakkayal, Kollam Canal, Chavara Canal and T.S.Canal flow parallel to the sea. The strip of land that lies between an ocean and another water resource is a place where disaster lurks. Only the coastal strip that extends from Pallithottam to Tangassery is the area protected by the breakwater. The safety of the breakwater is itself a disputed point. Indonesia and Japan have had experiences of the sea smashing across and transgressing huge breakwaters and encroaching into the land. Alappad Panchayath lying between the ocean and the canal stretching 14 kms long and width 50-300 meter is a naturally disaster prone area. Thanni, Eravipuram, Mukkam, Mundakkal, Panmana and Kovilthottam have geographical setting suitable for disasters to wipe away lives and properties and experience the havoc of high tide and sea erosion twice or thrice a year.

Table No. 1

District wise distribution of Coast line of Kerala

Sl. No.	District	Length of coastline	
		Length (in K.M.)	Percentage of Total
1	Thiruvananthapuram	78	13.20
2	Kollam	37	6.30
3	Alappuzha	82	13.90
4	Ernakulam	46	7.80
5	Thrissur	54	9.20
6	Malappuram	70	11.80
7	Kozhikode	71	12.00
8	Kannur	82	14.00
9	Kasargode	70	11.80
	Total	590	100.00

Source: Fisheries Department

Fisheries Department has declared 27 villages along the coast of Kollam district as Marine Fishing Villages.

Table No. 2

Fishermen population and fish landings in the marine fishing villages of Kollam District

Sl. No.	Name of Village	Population	Fish Landings
1	Paravoor South	1952	241
2	Paravoor North	3871	359
3	Mayyanadu	2263	157
4	Eravipuram North	6484	408
5	Eravipuram South	1547	569
6	Pallithottam	4308	312
7	Port Kollam	5647	2195
8	Moothakkara	2886	671
9	Vaddy	3394	573
10	Thangaserry	4138	815
11	Kannimel	1720	748
12	Sakthikulangara	6116	73160
13	Neendakara	3883	32333
14	Puthenthura	4128	15077
15	Karithura	3131	1665
16	Kovilthottam	3706	186
17	Panmana	901	54
18	Pandarathuruth	3454	1668

19	Vellanathuruth	6748	982
20	Cheriazheekal	2807	1331
21	Alappad	2700	3630
22	Kuzhithura	1457	467
23	Parayakadavu	2051	1459
24	Sraikadavu	7341	929
25	Azheekal	2824	2384
26	Maruthurkulangara	5129	
27	Kulashekharapuram	3453	
	Total	98039	142373

Total no. of fishing village in Kerala - 223
 Fishermen population - 827953
 Fish landings - 593783

Table No. 3

Marine fishermen population 2001-2002

District	Men	Women	Children	Total
Kollam	31527	28863	37649	98039
State total	256668	248599	322686	827953

According to the Marine Fisheries Census conducted by Central Marine Fisheries Research Institute Cochin in 2005 the marine fishermen population was 6, 02,234 and the total no of house hold was 1,20,480. According to the above census number of marine fishermen households in Kollam district was 11,899 and fisher folk population 43210. (See Annexure for more details)

Table No. 4

Fishing Harbours in Kollam District

Constructed	Under construction
Neendakara (Sakthikulangara) Tangassery	Azheekal (Kayamkulam) (Alappad)

Table No. 5

Fish landing centers proposed for Traditional Fishermen in Kollam District

1. Paravoor
2. Pallithottam
3. Sakthikulangara
4. Puthenthura
5. Cheriazheekal
6. Azheekal

Table No. 6

Details of Active fishermen in Kollam district (2001-2002)

Marine Population	Active fishermen	Percentage
98039	19943	20.34
(State total) 827953	177068	21.39

Table No. 7

Crafts in operation in the marine sector in Kollam District (2002-2003)

	Mechanized	Motorized	Non-mechanized	Total
Kollam	1127	3144	2620	6891
State total	4510	29395	21956	55545

Table No. 8

Beneficiaries under state sponsored savings cum relief scheme

(Marine 2001-02 in Kollam Dist.)	15570
Fishermen pensioners (marine)	4097

These figures refer only to registered fishing vessels. Unregistered fishing vessels could be of equal number.

Table No. 9

Disaster prone area in Kollam Dist. (Local Bodies / PRIs)

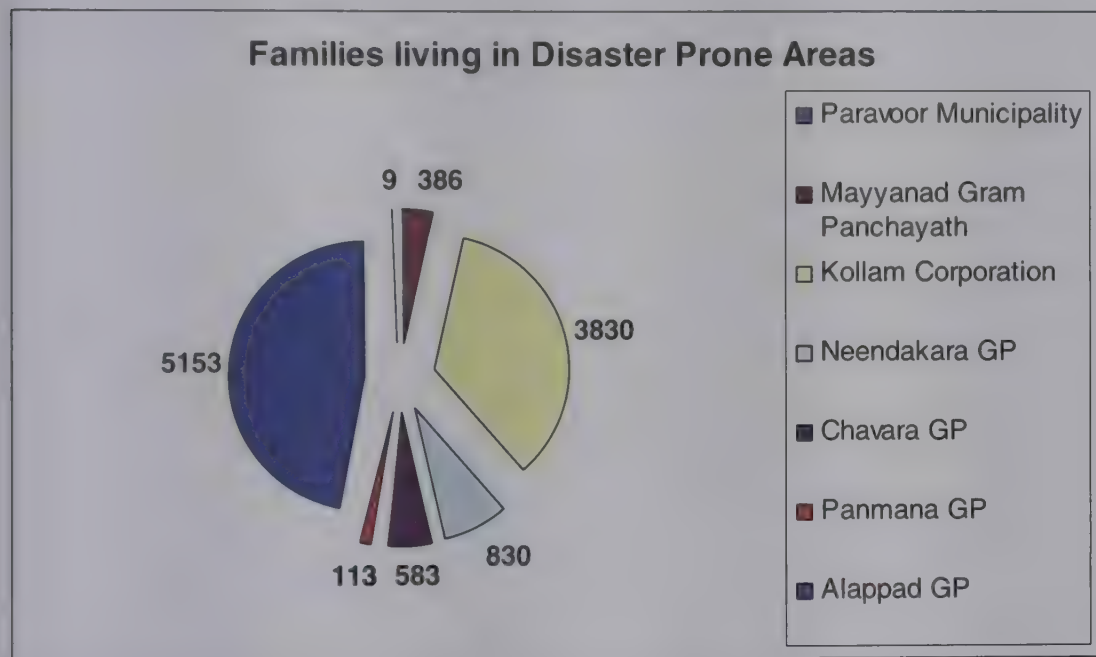
Sl. No.	Place	Municipality/ Panchayath	Ward
1	Azheekal	Alappad	1 to 5
2	Sraikkad	"	6
3	Parayakadavu	"	7
4	Kuzhithura	"	8
5	Alappad	"	9
6	Cheriazheekal	"	10-12
7	Pandarathuruth	"	13,14
8	Vellanathuruthu	"	15
9	Panmana	Panmana	18
10	Kovilthottam	Chavara	1
11	Neendakara	Neendakara Panchayath	8
12	Sakthikulangara	Kollam Corporation	1
13	Thirumullavaram	"	52
14	Mundakkal	"	42
15	Pallithottam	"	44
16	Eravipuram	"	35
17	Mukkam	Paravoor Municipality	8
18		Mayyanad Panchayath	12

8. Disaster prone area survey findings

Quilon Social Service Society conducted an extensive survey in the 37 km. coastline from Paravoor to Azheekal (Kayamkulam estuary) with a view to identify the people living in disaster prone area in Kollam District and their socio-economic details. Findings of the survey are given hereunder:

I. Demography

a. Families living in disaster prone area



Sl.No	LSG Name	Total number of families		
		Nuclear Family	Joint Family	Total
1	Paravoor Municipality	8	1	9
2	Mayyanad Gram Panchayath	355	31	386
3	Kollam Corporation	3339	491	3830
4	Neendakara GP	701	129	830
5	Chavara GP	498	85	583
6	Panmana GP	111	2	113
7	Alappad GP	4812	341	5153
	Total	9824	1080	10904

A total number of 10904 families live in disaster prone area in the district

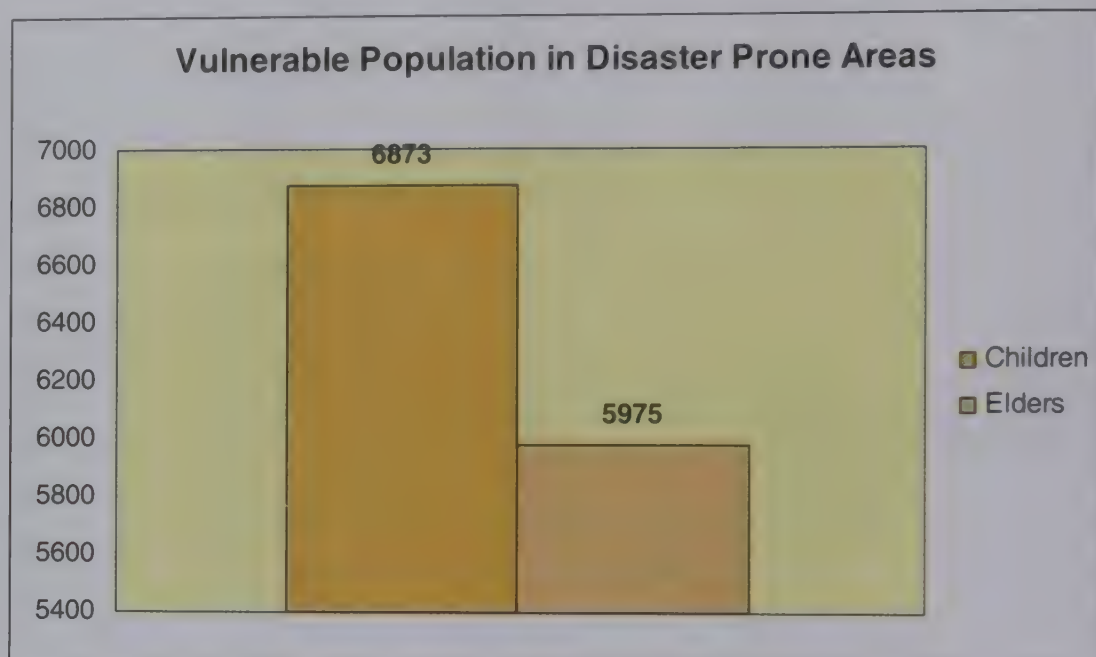
b. Gender Details

Sl.No.	Particulars	Number	Percentage
1	Male	26199	49.89
2	Female	26319	50.11
	Total	52518	100

c. Type of Family

Sl.No.	Particulars	Number	Percentage
1	Nuclear Family	9824	90.10
2	Joint Family	1080	9.90
	Total	10904	100

d. Vulnerable families in the project area

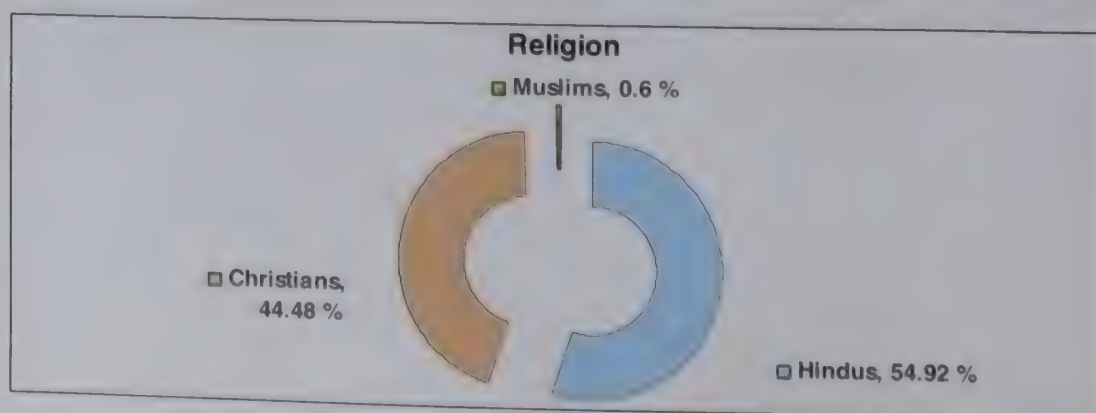


Children and elder persons constitute the most vulnerable groups in a disaster context. It may be noted that the segment of elders and children are very high in the reference area.

e. Religion

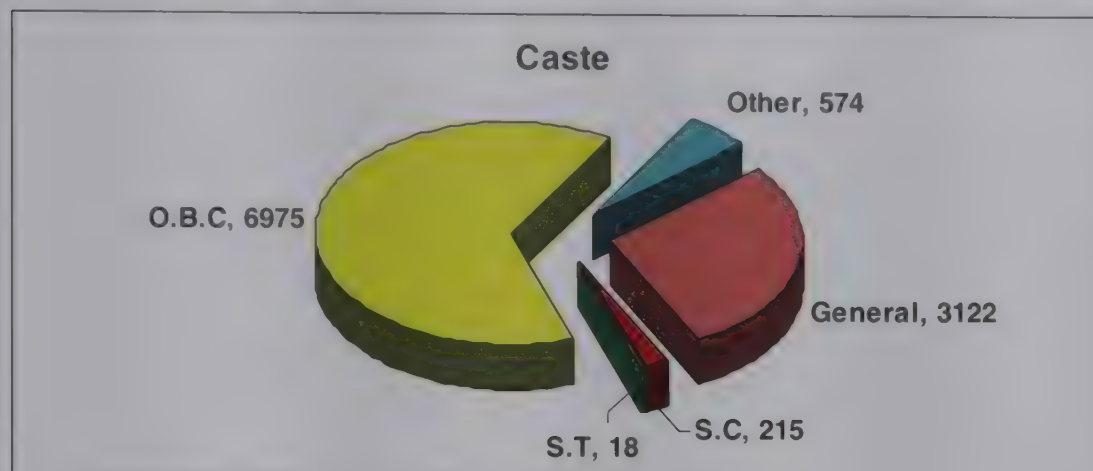
People of three major religions live in harmony here.

Sl.No.	Religion	Number of Families
1	Hindus	5989
2	Christians	4850
3	Muslims	65
	Total	10904



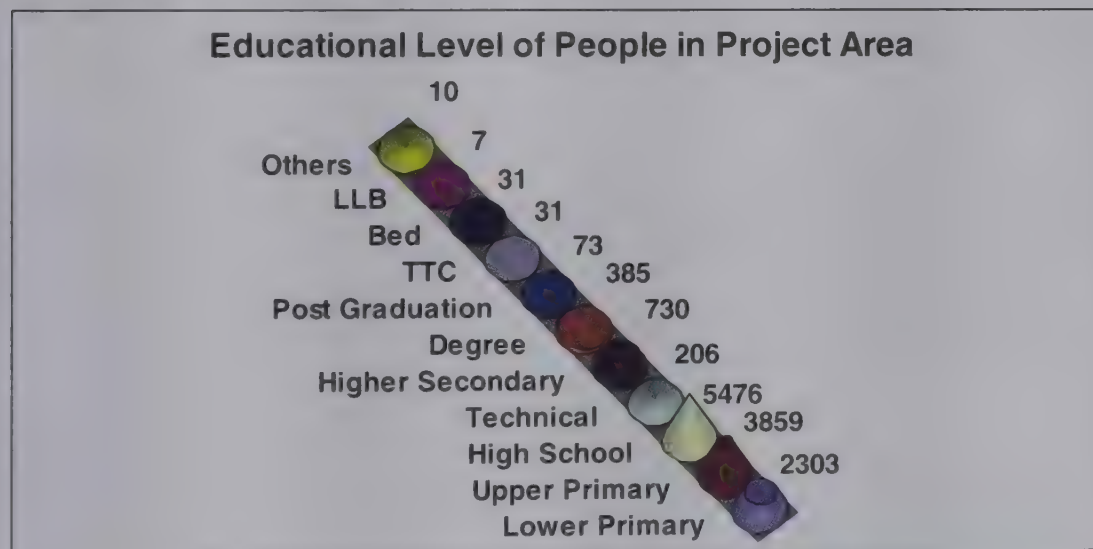
f. Caste

Majority of the reference group are classified under "Other Backward Communities" with the general category taking the second place. S.C. and S.T group forms a very small segment.



g. Education

Literacy level is appreciably high. In terms of formal education the ratio of people taking up professional courses and proceeding to higher education is not high. We have not studied the rate of dropouts.



Sl.No.	Status	Numbers	Percentage
1	Lower Primary	2303	17.57
2	Upper Primary	3859	29.43
3	High School	5476	41.77
4	Technical	206	1.57
5	Higher Secondary	730	5.57
6	Degree	385	2.94
7	Post Graduation	73	0.56
8	TTC	31	0.24
9	Bed	31	0.24
10	LLB	7	0.05
11	Others	10	0.08
	TOTAL	13111	100

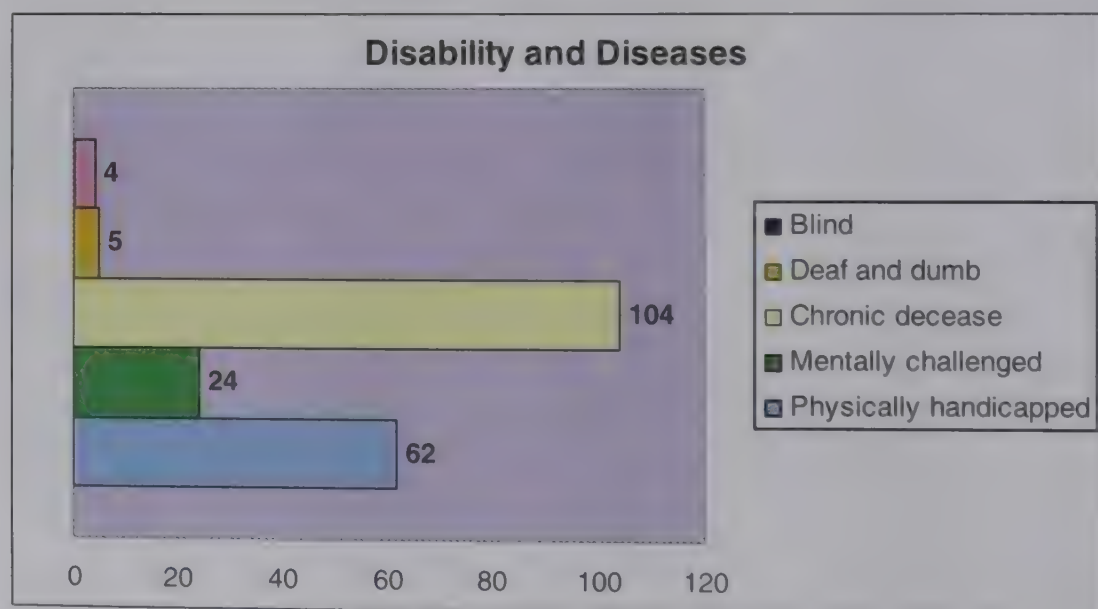
h. Occupational details

Majority of the people earn their livelihood from fishing. 7332 men go for fishing. Number of Govt. employees is not negligible though their occupation sectors remain largely unexplored. Number of unemployed women or who are merely house wives is as high as 2869.

Sl.No.	Occupation	Number of People	Percentage
1	Fishing	7332	67.51
	Fish vending	383	3.53
3	Govt. Employee	247	2.27
4	Doctor	2	0.02
5	Nurse	9	0.08
6	Self employed	19	0.17
7	House wife	2869	26.42
	Total	10861	100.00

i. Disability

The number of differently abled people is not too small. However the survey findings about the number of persons suffering from chronic diseases and people with disabilities doesn't seem to be accurate.



Sl.No.	Type of disability	No. of People affected	Percentage
1	Physically handicapped	62	31.16
2	Mentally challenged	24	12.06
3	Chronic disease	104	52.26
4	Deaf and dumb	5	2.51
5	Blind	4	2.01
	Total	199	100.00

j. Housing status

Housing details of reference group is interesting. 88.76 % of families live in own houses while 11.15 % live in rented houses. 73.02 % of families have been living in disaster prone area since ten years and more, 11.12 % since five to ten years, 13.84 % since one to five years. This shows there is a steady increase in families moving to stay in disaster prone area.

The design of houses, and materials used show that a large number of people have invested their saving in housing and it looks like they intend to have a permanent stay here. While 29.50 % of families live in huts, 66.58 % of families live in single storied houses and 3.91 % in double storied houses. Pattern of housing roof and materials used for wall is yet another factor that was studied. 37.77 % of houses, have R.C.C. roof with tiled roof taking second place with 21.21 % ; 12.91 % of houses are thatched with coconut palms. 57.19 % percentages of houses are built with cement bricks.

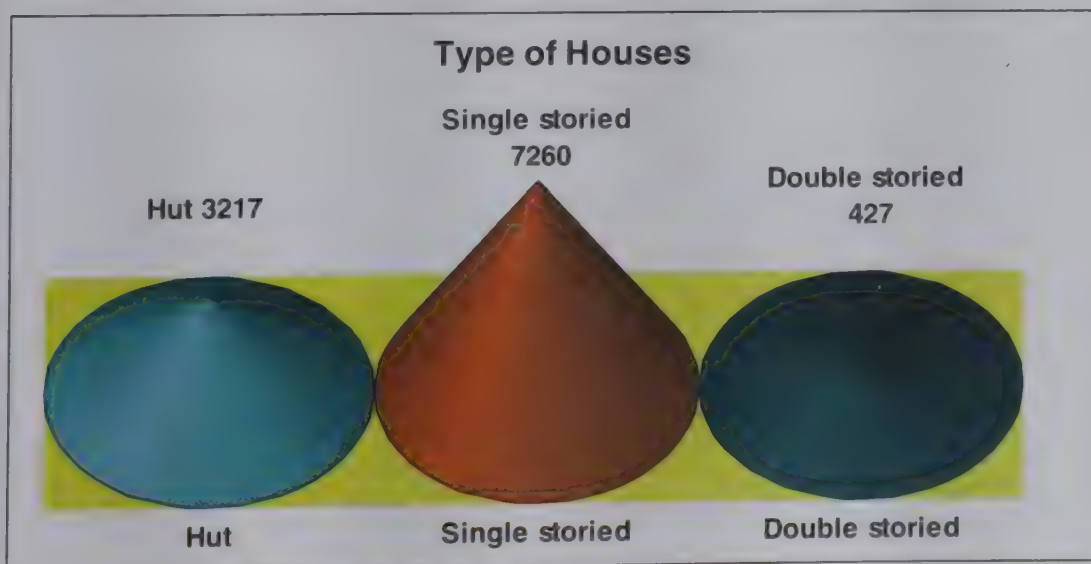
(a) Ownership of Houses

Sl.No.	Ownership	Total Number	Percentage
1	Own House	9679	88.77
2	Rented House	1216	11.15
3	Temporary Shelter	9	0.08
	Total	10904	100.00

(b) Duration of Stay

Sl.No.	Particulars	Total number of Families	Percentage
1	Below one year	194	2.00
2	1-5 years	1340	13.84
3	5-10 years	1077	11.13
4	Above 10 years	7068	73.02
	Total	9679	100.00

(c) Type of houses



(d) Pattern of Roofing

Sl.No.	Roof type	Numbers	Percentage
1	Thatched	1408	12.91
2	GI sheet	1217	11.16
3	Asbestos	885	8.12
4	Tiled	2313	21.21
5	Concrete	4141	37.98
6	Other materials	940	8.62
	Total	10904	100.00

(e) Materials used for wall

Sl.No.	Type of Materials	Number	Percentage
1	Cement brick	5854	57.19
2	Mud brick	1721	16.81
3	Wood particles	846	8.26
4	Bamboo	80	0.78
5	Coconut leafs	1735	16.95
	Total	10236	100.00

Flooring: Except for a few houses all the houses have cement flooring. Some have even mosaic or marble flooring. Some have used expensive tiles for flooring. Only a few huts have floors with cow dung or just sand.

k. Extent of land possessed

Extent of land possessed by families in the reference group is quite revealing. Only 2.86% of families possess land up to 30 cents while 46.21% possess five cents of land or less. Average land holding is 4 cents.

Sl.No.	Cents of Land	Number of Families	Percentage
1	Below 5 cents	4473	46.21
2	5 to 10 cents	3251	33.59
3	10 to 15 cents	980	10.13
4	15 to 30 cents	698	7.21
5	Above 30 cents	277	2.86
	Total	9679	100.00

l. Title deed

92% of families own title deed of the land. It is not quite clear how many families have registered documents of property and how many enjoy only possession certificate of the public land they now occupy.

Sl.No.	Yes	Percentage	No	Percentage
1	9055	91.98	789	8.02

m. People with land in other places

Survey probed into the number of families who own land in other places. It is seen that only 7.51 % (819) families do have land in other places ranging from 5 to 30 cents. These families live in a disaster context for convenience of job or livelihood security.

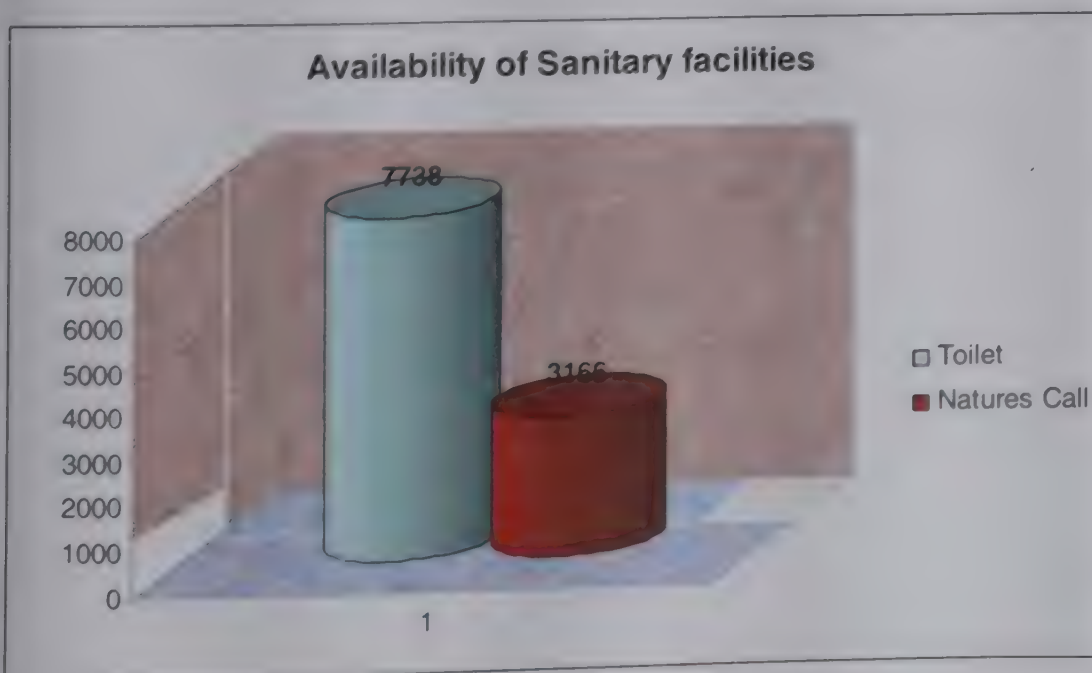
Sl.No.	People with land in other places	Percentage	People with no land in other places	Percentage
1	819	7.51	10085	92.49

n. Extent of land in other places

Sl.No.	Cents of land	Total number of families	Percentage
1	Below 5 cents	226	27.59
2	5 - 10 cents	272	33.21
3	10 - 15 cents	120	14.65
4	15 - 20 cents	57	6.96
5	20 - 25 cents	30	3.66
6	25 - 30 cents	38	4.64
7	Above 30	76	9.28
	Total	819	100.00

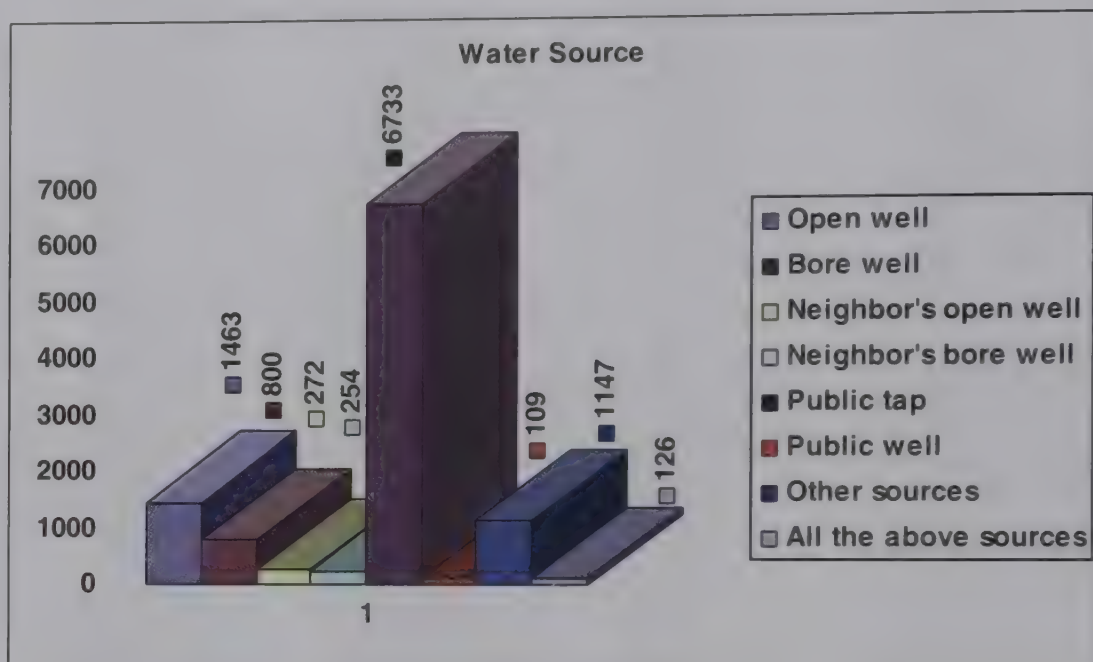
o. Sanitary latrine

70.96 % of families have sanitary latrines while 29.04% families do not have latrines and possibly use the coastline as latrines.



P. Drinking water sources

61.74 % of families resort to public taps for their water needs while others use public wells or neighbour's bore wells. It is seen than 7.34 % of families (800) have own Bore well and 13.42% (1463) have open wells. This is a big number. Lack of adequate and safe drinking water sources is a matter of concern.



q. Distance from house to sea

Study of the distance of houses from the sea is a matter of grave concern. Vulnerability gauging is easy while one scans through the graph of distance of houses from the sea. 14.16% of families live in a distance of 10 meters from the sea. Total number of families living in close proximity to sea - distance of 50 meters is 6233 which is 57% of the reference group. Remaining 42.83% of families (4671) live in a distance of 50 to 200 meters from the sea. Tsunami has exposed the vulnerability aspect and it can be said that people live with recurrent frightening dreams of impending calamities.

Distance from sea

Sl.No	LSG Name	<10 meter	10 to 20	20 to 30	30 to 40	40 to 50	50 to 200	Total
1	Paravoor Municipality	4	4	0	0	0	1	9
2	Mayyanad GP	70	54	33	28	51	150	386
3	Kollam Corporation	581	441	243	193	467	1905	3830
4	Neendakara GP	168	177	89	50	134	212	830
5	Chavara GP	34	143	208	52	49	97	583
6	Panmana GP	5	17	39	14	35	3	113
7	Alappad GP	682	465	562	260	881	2303	5153
	Total	1544	1301	1174	597	1617	4671	10904

r. Reasons for habitation near the sea

Response to this all-important query is enlightening. Following reasons have been cited by people

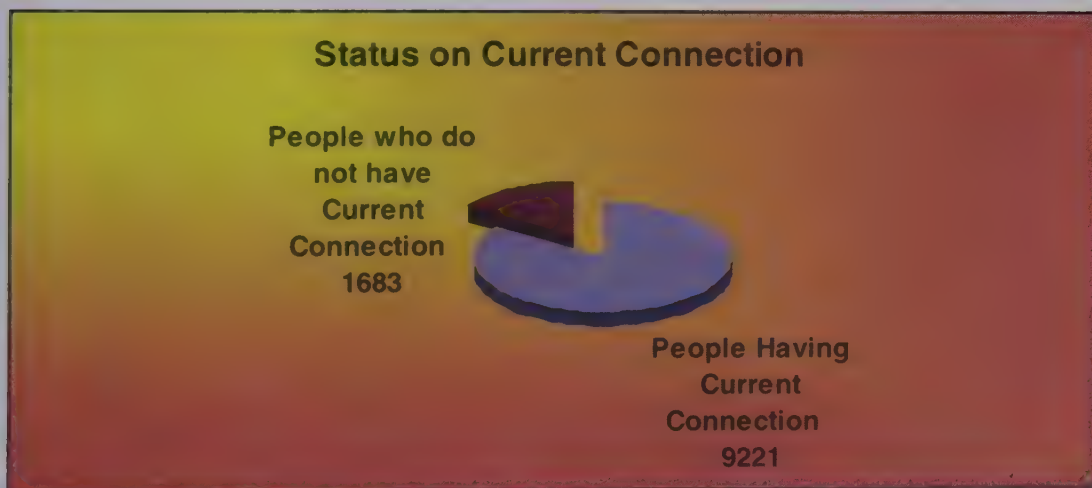
- A. There is no other place to live
- B. Had to sell their plot to clear debt or for the marriage of daughters
- C. Convenience of occupation
- D. Other reasons

Many of the people gave response with two of the above reasons coupled together

Sl.No	Name of GP	A	B & C	C	A & B	A & C	D	Total
1	Paravoor Municipality	9	0	0	0	0	0	9
2	Mayyanadu GP	174	6	100	0	106	0	386
3	Kollam Corporation	2583	19	881	19	323	5	3830
4	Neendakara GP	396	1	101	3	327	2	830
5	Chavara GP							
6	Panmana GP	42	0	71	0	0	0	113
7	Alappad GP	2994	6	1696	1	149	34	4533

s. Electrification

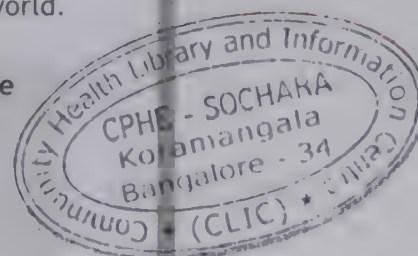
85 % of houses have electric connection. This shows the magnanimity of Government bypassing all objections.



t. Use of media

Survey shows that 73.10 % of people resort to Television for information and entertainment. Only 4.91 % of people use Print media for contact with the world.

Sl No	Media	Numbers	Percentage
1	Printed medias (paper, weekly)	263	4.91
2	Television	3908	73.10
3	Radio	250	4.67
4	All of the above	925	17.30



u. Solid Waste disposal

Waste disposal remains the urgent concern of the reference area. 64.77% of people use sea or seaside or canal for waste disposal creating new environmental and health issues. One cannot but appreciate the rather high number of families who have taken up composting as a creative channel for waste management. One cannot miss the appalling sight of huge piles of waste in the coastal belt which needs to be addressed.



v. Liquid waste disposal

Liquid waste management is an area that has not been attended. Only a small portion of people (3.45 %) use soak pit system while others channelise the waste to the canal or drain in their own premises causing health problems in the area.

Sl.No	Type of Disposal	Total No. of Families	Percentage
1	Soak pit	376	3.45
2	Drained in house compound	5153	47.26
3	Canalize to the stream / backwater	5375	49.29
	Total	10904	100.00

w. Aware of disaster proneness

93 % of inhabitants are aware of the vulnerable situation they are living in.

People aware of Disaster
Proneness
10770

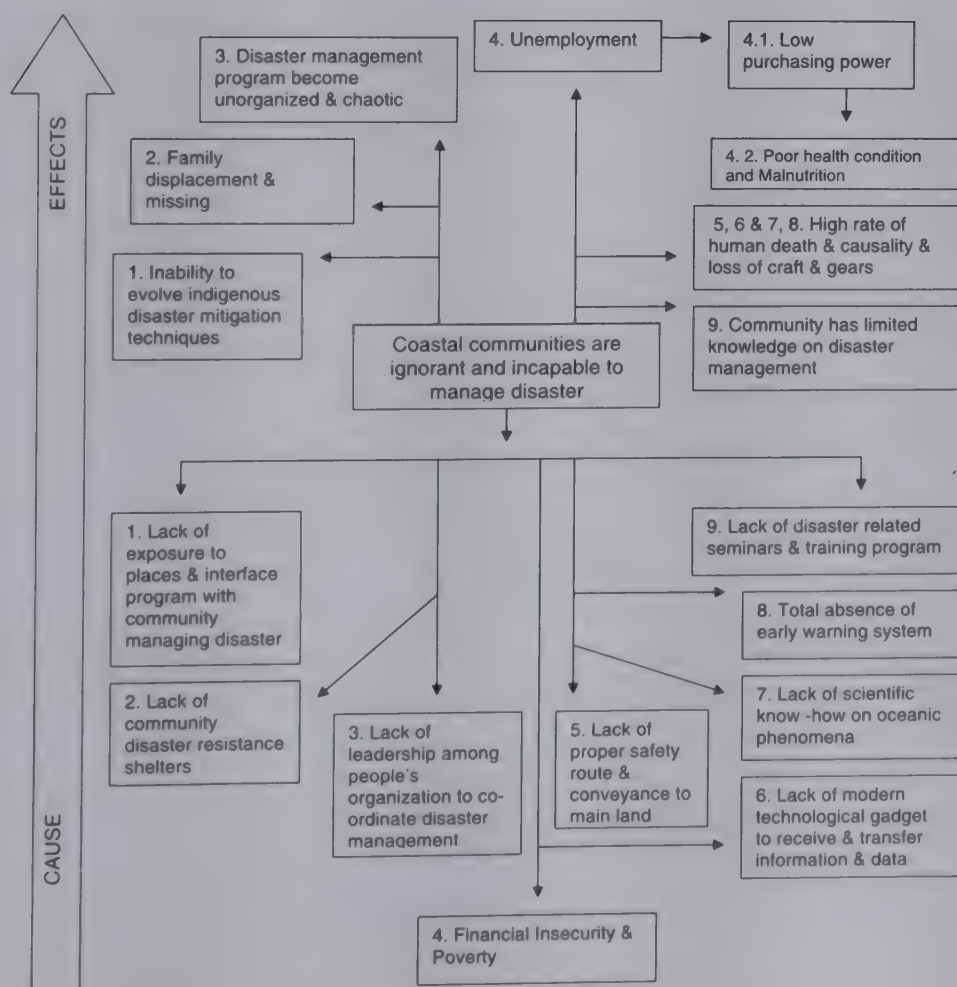
People not aware of disaster
Proneness
134

9. Participatory learning and Action - Findings

One can assess the resilience of a community only in the context of its socio-economic matrix. Disaster preparedness is immediately related to the Development status of a given community. Anderson and Woodrow has defined Development as "the process through which people increase their capacities for producing things they need and for managing their political and social lives as they desire and at the same time (especially in disaster prone areas) reduce their immediate and long term vulnerabilities to events which threaten their economic and socio-political existence." International conventions have linked Disaster Management with sustainable development. Building resilience is to be read in the context of advancing the dream of a Nation or a Community to attain self-reliance.

As a sequel to the socio-economic survey of the reference group, our CBDP team interacted with the people to identify the vulnerable situation and to assess the resources of the coastal communities. "Participatory learning and Action" was taken up as a scientific tool in our social enquiry to assess the resources, determine the fields of action and to decide with the people the strategies. We could enlist the co-operation of elected representatives of people, officials of various Govt. agencies and departments through these interactive sessions. This process was carried out in 22 centers in the project area.

9.1. Cause and effect Matrix



Cause and effect have to be matched for a factual situational analysis and to set viable objectives for a community seeking ready response for future disasters. Lack of scientific knowledge about disasters and inadequate leadership seem to emerge as the main causes for the general socio-economic and cultural backwardness of our reference area. Glancing through the accepted parameters of human development one fails to understand how a community survived with so little control on physical resources.

9.2. Backwardness Index

Our CBDP team has identified several factors that contribute towards the overall backward status of the community under the reference area.

9.2.1. Socio-Economic Situation

- ❖ Density of Population
- ❖ Inadequate land holding or landlessness
- ❖ Inadequate and unsafe dwelling places
- ❖ Houses which need repairs
- ❖ Under utilization of potential of the youth
- ❖ Depletion of fish resources
- ❖ Seasonality of occupation - fishing being uneconomic or impossibility of taking out to sea for a quarter of the year
- ❖ Lack of proper fishing gear suitable to different fishing seasons or for different species
- ❖ Increasing operational cost of fishing especially for fishermen using outboard engine and inadequate auctioning arrangements depriving fishermen maximum price for fish harvested
- ❖ Lack of exposure or skill in alternative livelihood options

9.2.2. Health

- ❖ Unhygienic environment
- ❖ Lack of safe drinking water sources
- ❖ Improper waste management facilities and inadequate drainage system
- ❖ Improper and inadequate latrine facilities
- ❖ Lack of access to proper health care facilities offered by private sector and the inadequate facilities in Govt. hospitals and health centers.
- ❖ Possibility of the spread of epidemics
- ❖ Typhoid, pneumonia, bowel disorder, diarrhoea, allergy, bronchitis, headache, backache, bone problems, diseases of the urinary system, elephantiasis, mumps, different types of fever and cold are the diseases chiefly found in this area.
- ❖ Incidence of all forms of cancer is high in the area
- ❖ HIV infected people have been identified
- ❖ Improper arrangements for preventive measures
- ❖ Lack of information on health matters
- ❖ Excessive use of alcohol, increasing attraction to drugs
- ❖ Increase in mental health problems resulting in trauma and mental disorder

9.2.3. Environmental

- ❖ Sea erosion / high tide
- ❖ Unscientific seawalls
- ❖ Sand mining / extraction of minerals
- ❖ Lack of infrastructure like all reason roads and transport facilities
- ❖ Water logging / Inadequate facilities for waste disposal

9.2.4. Educational aspects

As regards Education the reference group has not availed of the rather adequate facilities at their reach and affordability. It would appear that the fishing community is not making a conscious effort to migrate to other options which education will offer them. By far Alappad Panchayath seems to be better placed compared to other coastal villages in Kollam district as regards reaching out to higher education. Dropout rate especially among girls in coastal villages seems to be higher than other groups in the state.

9.2.5. Infrastructure

- ❖ Absence of physical connectivity. Several wards are yet to be linked with mainland by bridges. Case in point is Thanni.
- ❖ Weak sea walls
- ❖ Inadequate sea walls
- ❖ Inadequate transport system
- ❖ Lack of permanent relief centers. This is all the more important in Eravipuram, Thanni, Mayyanad belt which experiences several flash floods and high tide invasion.

9.2.6. Geographic Constraints

Alappad a barrier island has its geographic constrains. "Barriers are best developed where the tidal wave is relatively low and the wave energy is low". Running parallel to the mainland but separated from the mainland by a canal Alappad has an inbuilt vulnerability to hazards. The geographic setting is similar in many parts of Kollam coast. The coastline of Paravur, Mukkam, Thanni & Eravipuram is a long coastal stretch running parallel to the mainland separated by Paravur Kayal with scanty escape routs like bridges or ferry services. Two bridges one at Paravur and the other at Eravipuram are at extreme edges. From Mundakkal coast up to Mahatma Gandhi Park it is again a coastline sandwiched between sea and a canal (Kollam Thodu). This is again a densely populated area. Hundreds of families have pitched their huts on the banks of the canal making the situation all the more precarious.

The coastline from Mahatma Gandhi Park up to Chavara bridge is very much part of the mainland with distance between sea and canal or Ashtamudy Lake comfortably big. The brake water makes the Kollam coast a safe haven against high tide, which used to ravage the coast year after year. The coastline from Chavara Bridge to Kovilthottam is again sandwiched between the sea and canal. Kovilthottam beaches are definitely in a very vulnerable state with mining on the seacoasts and the canal running parallel at close distance. From Kovilthottam up to Vellanathuruthu it is again a broad coastline this time canal far away. But once we enter Alappad we are in a typical barrier island with the sea and T.S. Canal running parallel. There is only one bridge to connect the barrier island with the mainland. Two bridges are now under construction. Matha Amridanantha Mai Math has consturted a pedestrian bridge across the canal.

The reference area has two estuaries one at Neendakara and the other at Azheekal. Swami Nathan Committee has made specific recommendations as regards regulation of development activities in estuaries. Lagoons and lakes and canals close to sea are also to be attended to and protected for proper coastal management.

9.2.7. Coastal Erosion - Is it the end of the road?

Coastal erosion is a major concern in the reference area as in many of the coastal villages in the country. The break water built recently in Tangassery has arrested shore erosion in the coast stretching from Tangassery to port Kollam but resulted in serial sea erosion in the coast from Mukkam to Mundackal. Besides Natural causes like rise in sea level there are manmade causes like sand removal and mining, which aggravate the situation. The general consensus in the PLA was that there should not be any compromise in maintaining the stability of the shoreline. Construction of seawall on the eroding coast is done unscientifically and is actually a source of siphoning state funds by the alliance of politicians, Govt. officials and contractors. Seawall in a given coast only adds to hazards in an adjacent coastal area. "Soft engineering measures such as coastal regulations, beach nourishment are to be preferred for coastal protections".

Ignorance about the dynamics of coastal ecosystems is a major hurdle to be addressed. Coastal people have to be informed about the best practices in other disaster prone areas and the current information about ocean and the recommendations of national commissions for disaster management ensuring in a collective will to overcome.

In many PLA's there was unanimity about relocating families living in spots adjacent to sea.

9.2.8. Fire Accidents

PLA also probed into the causes of recurring fire accidents in the coastal areas. Negligence of people and use of flammable materials for roofing of huts and storage houses resulting in loss of property and fishing equipments were identified by the people.

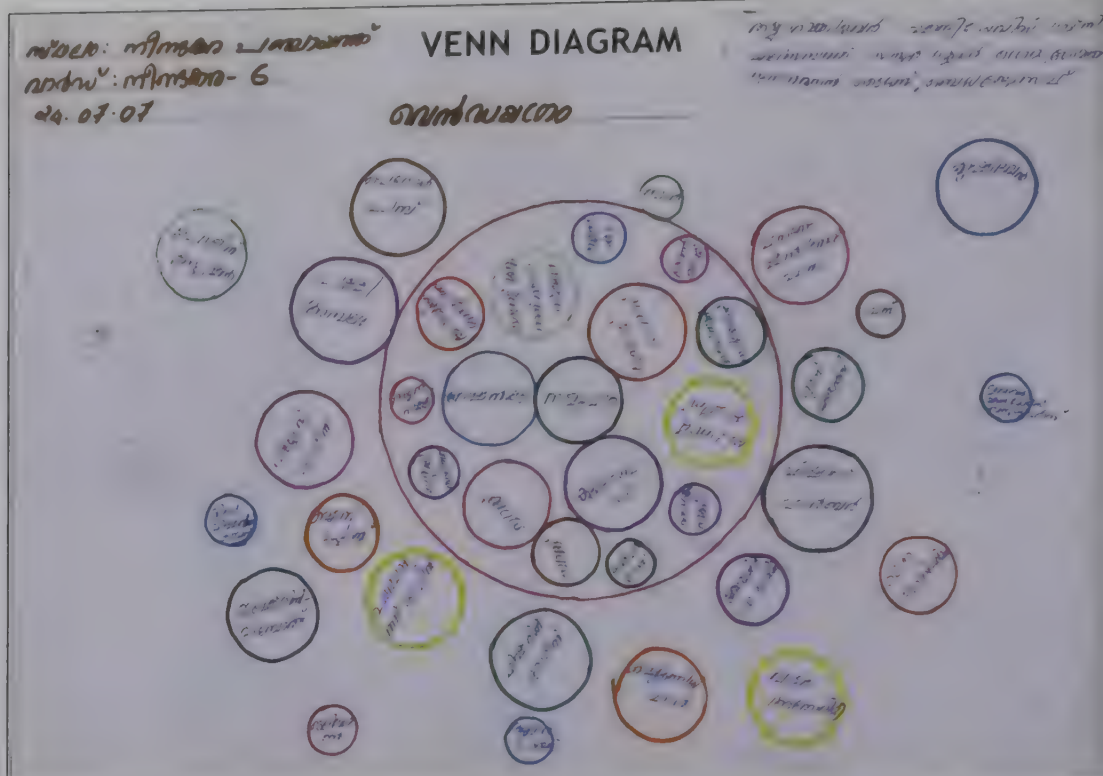
9.3. RESOURCE MAPPING

The reference communities have prepared Resource Maps spotting safe shelters, escape routes, medical and sanitation facilities etc in their respective villages. Mapping makes it easy for people to appreciate their facilities and limitations.

Any preparedness plan related to disasters in the project area must take into consideration the increase or decrease of vulnerability on account of the water bodies in the area. The important water bodies that run parallel to or pour in to the sea are Ashtamudi Lake, Paravoor Lake, Kollam Thodu and T.S.Canal. At the northern edge of Kollam coast is Kayamkulam estuary at Alappad where Kayamkulam Lake pours into the sea. A fisheries harbor is nearing completion here. Actually the sea and the lake or canal co-exist and are bound together by a strange bond. Swaminathan Committee has specifically stated that inland water bodies must be included in coastal zone management.

Survey of the various institutions in the area and their linkages as regards support to people in the wake of disaster was undertaken in all the villages in the project area. Support services include space for temporary shelter, medical aid, conferences and psychosocial relief.

Fishermen live in clusters on religious or ethnic basis. In our reference area fishermen communities are either Hindu or Christian {Latin catholic} and as such



they are intimately attached to their religious or community organizations who exert great influence in their social life including their occupation. In the case of Christian fishermen they always look up to their parishes and the diocese for support. The Hindu fishermen have their Karayogams that decide almost everything. As social institutions, that influence the day to day activities of people, all disaster management measures be it relief or rehabilitation or preparedness must link with the parishes and Karayogams.

Major institutions in the project area and their role in responding to disasters have been defined. Their role in tsunami response was at different levels and they do have a role in our disaster preparedness programme. List of institutions identified are both internal and external to the concerned village but with definite relationship with the community. The significance and importance of the institutions as well as the access of the community to each institution has been assessed and marked as such in the Venn diagram. Institutions listed include Govt line departments {revenue, transport, health, electricity, water supply, public distribution, communication post office, veterinary} and their offices, Panchayath Raj Institutions, Schools, Private Health Centers. Anganwadis, Youth Clubs, NGOs, Churches, Temples and Mosques, Banks etc... Venn diagrams for each CDBP village have been prepared with description of specific linkages, services and telephone numbers for ready reference by ERT's and people.

9.5. A HISTORICAL SURVEY OF THE DISASTERS IN THE PROJECT AREA (ORAL HISTORY)

The reference area has a long history of disasters. The collective memoirs of people of disasters down the years have been listed. The elders of Alappad for example do remember the yesteryears when the sea was miles away with townships all now buried under the sea. The historical survey documented by people does confirm the high vulnerability of the area.

Grave Disasters Faced by the People from 1960

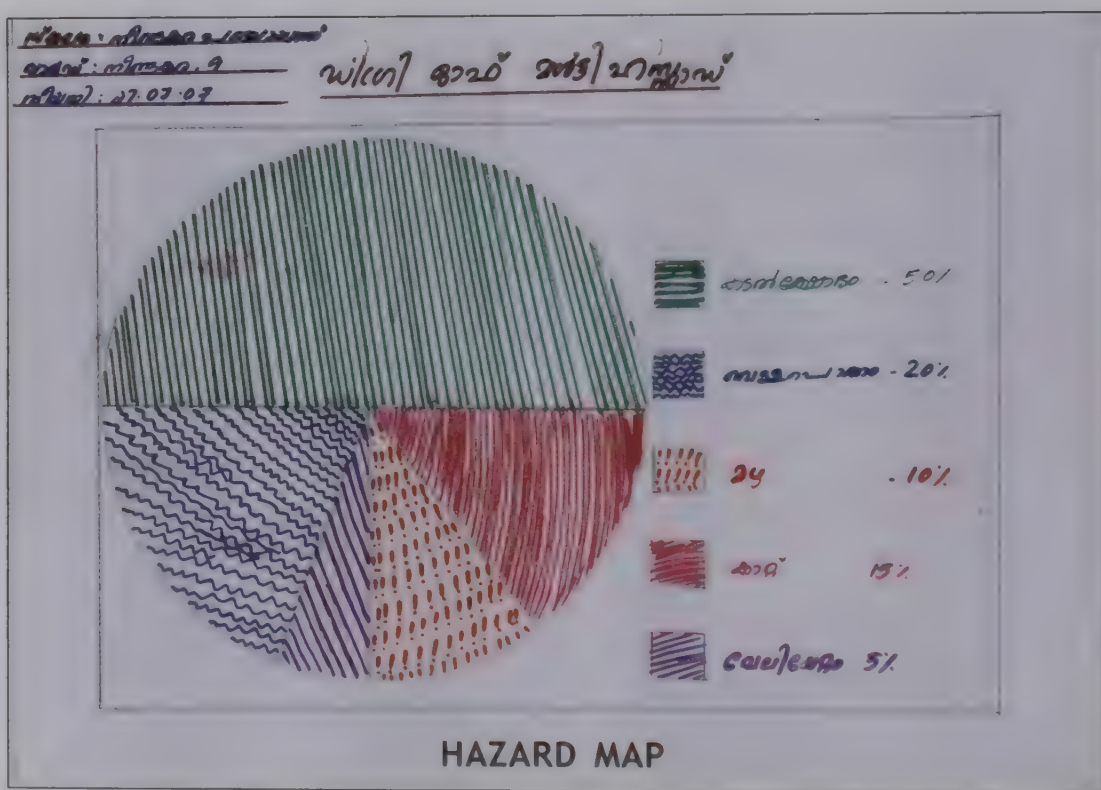
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Society

Year	Place	Nature of Disaster
1960	Mukkam	Flood, Encroachment of the sea
1964	Azheekkal	Encroachment of the sea
1965	Cheriazheekal	Hurricane
1970	Eravipuram	Encroachment of the sea
1974	Eravipuram	Flood
1975	Eravipuram	Communal riot
1976	Sakthikulangara	Flood
1977	Mukkam	Flood
1977	Pallithottam	Encroachment of the sea
1978	Kollam district	Flood
1978	Kollam coastal area	Encroachment of sea
1978	Pandarathuruth	Communal riot
1979	Neendakara	Storm
1979	Azheekkal	Flood
1979	Pandarathuruth	Flood
1979	Vellanathuruth	Flood
1980	Vellanathuruth	Communal riot
1981	Neendakara-Karunagapally	Encroachment of the sea
1981	Mavelikkara	Flood
1983	Pallithottam	Communal riot
1983	Sakthikulangara	Tidal waves
1983	Kollam coastal area	Fire accident
1984	Pallithottam	Fire accident
1985	Neendakara	Encroachment of sea and cyclone
1986	Neendakara	Encroachment of the sea
1986	Cheriazheekal	Encroachment of the sea
1986-87	Kollam coastal area	Encroachment of the sea
1988	Pandarathuruth	Flood
1989	Tangassery	Fire accident
1991	Thirumullavaram	Tidal waves
1993	Eravipuram	Communal riot
1994	Eravipuram	Tidal waves
1995	Pandarathuruth	Storm
1995	Mundakkal	Tidal waves
1995	Thirumullavaram	Encroachment of the sea
2000	Pandarathuruth	Hurricane
2001	Eravipuram	Encroachment of the sea
2002	Moothakkara	Ethnic Conflict
2002	Eravipuram	Tidal waves
2002	Pallithottam	Encroachment of the sea
2003	Eravipuram	Encroachment of the sea
2004	Eravipuram	Encroachment of the sea
2004	Azheekal	Tsunami
2004	Sakthikulangara	Tsunami
2005	Azheekal	Encroachment of the sea
2005	Sakthikulangara	Boat accident
2005	Eravipuram	Encroachment of the sea
2006	Vaddy-Tangassery	Fire accident
2006	Eravipuram	Sea Erosion
2007	Eravipuram	Sea Erosion

9.6. VULNERABILITY MAP, HAZARD MAP, RISK MAP

Vulnerability, hazard and risk are related issues as regards disaster and are very scientific in nature. Vulnerability can be defined as the extent to which an individual, a community, sub-group, structure, service, or geographic area is likely to be disrupted by the impact of a particular disaster hazard. It is the probability of being damaged. As such it is a very dynamic process involving a variety of factors.

Geographic vulnerability is to be mapped scientifically for effective disaster management. Many developed countries have done such mapping. Seven parameters are taken into consideration to prepare vulnerability mapping. They are elevation, geology, geomorphology, sea level trends, horizontal shoreline displacement, tidal ranges and wave heights. Expert bodies appointed by the Govt must prepare and make available the vulnerability map for the whole country. We are yet to have access to the above maps that should enable us to capture the horizon of our involvement.



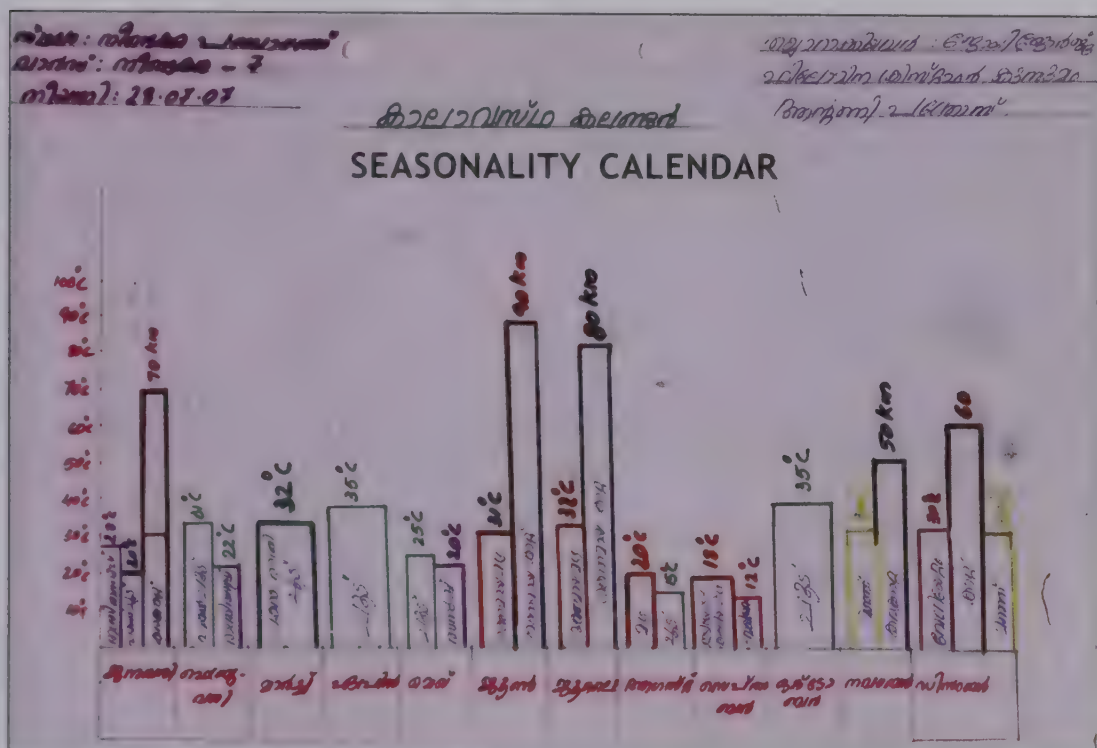
Vulnerability is more often used to describe the socio economic constraints and physical factors that reduce the ability of a community or individual to cope with the impact of hazards. Certain sections of people classified as vulnerable are to be cared especially in disaster context. These groups include elderly people, children, people with disability, sick and ailing people widows, single women and pregnant women. Very often it is this section of people who share the major part of loss of life. People who live very near the sea are also classified as a vulnerable group. Families living in thatched huts are vulnerable in the context of accidental fire. Special package has to be worked out for the above sections for disaster management. Risk mapping identifying the above groups and the risk extent has been prepared for each of our village by the people with the help of CBDP team and put in place for ready reference and action.

Vulnerability is attached to the socio economic status of a community. It is often the poor and marginalised who bear the brunt of disaster and hence preparedness cannot evade the sustainable development issue. Organisational vulnerability and attitudinal vulnerability are also areas to be addressed. Communities that are less organised are more at risk than communities that are organised. It is also important to raise the confidence level of communities.

Hazard Mapping was taken up by the village committees as part of the PLA exercise and the communities could readily identify the hazard each area was exposed to as also the varying frequency. Risk map depicting the level of expected losses to human beings and property, has been prepared in each village.

9.7. SEASONALITY CALENDAR

The changes in the climate cause vicissitudes every month and even every day in the life of the people. Hence it becomes very necessary that people should know in advance the variations in the climate.



Kollam district has a tropical humid climate with an oppressive summer and plentiful seasonal rainfall. Southwest monsoon is from June to September. Northeast monsoon is from October to November. It is very hot from March to May. The rest of the year is generally dry though it can be sultry in the coastal belt. As far as the coastal people are concerned each season and climatic variations have their specific impact on life. Downpour of monsoon is almost always accompanied by sea erosion. In the summer fire accidents are not rare. Each climate needs specific preparations.

The UN climate panel meeting at Brussels last April accepted with concern the report of the scientists about global warming. "The report said change, widely blamed on human emissions of greenhouse gases, was already under way in nature and that desertification, drought and rising seas would hit hard in the tropics, from sub-Saharan Africa to Pacific islands. It is the poorest of the poor people even in prosperous countries who are going to be the worst hit¹⁵"

10. Community based disaster preparedness project

Community based disaster preparedness project envisions creation of resilient communities capable of managing disaster. Preparedness, mitigation and risk reduction are the pillars of the project. Paradigm shift affected is that local communities and not the outside agencies are the principal respondents to a disaster. We envision a community aware of its resources and in position to take up responsibilities. And yet disaster preparedness cannot be an isolated venture but has to be coupled with developmental initiatives. It is a question of addressing geological and social vulnerabilities from a development angle. Project is being implemented in selected wards of four LSG's viz Kollam Corporation, Neendakara Panchayath, Alappad Panchayath and Arattupuzha Panchayath. (See Annexure 3 for Project area)

Goal

Capacitation of coastal communities of ten wards of Kollam Corporation, 6 wards of Neendakara GP, 15 wards of Alappad GP & 13 wards of Arattupuzha GP to effectively manage disasters and promote sustainable development through community mobilization.

Strategic Objectives

- ❖ Strengthen capacities of Community based organisations and structures to address development issues in a collective manner.
- ❖ Promote and replicate locally specific water and sanitation structures and create community consciousness on eco-restoration and environment.
- ❖ Facilitate lobbying and networking with PRIs, Line Departments and other institutions for sustainability of the community initiatives.

Emergency Response teams (ERT's)

ERT's have been formed in villages. Training in specific tasks associated with disaster preparedness was imparted to the members. The teams include:

1. Early Warning Team
2. Search and Rescue Team
3. Medical and First Aid Team
4. Relief and Rehabilitation Team
5. Damage Assessment Team

About 2000 volunteers clubbed in 200 teams are holding the fort in forty coastal villages to combat and manage disaster.

11. Village Contingency Plan

This is a process of developing strategies, arrangements and procedures to address the humanitarian needs of those who can be adversely affected by potential crisis/disaster. An active contingency planning process enables individuals, teams, organisations and communities to establish working relationship between them which can make a critical difference in the response mechanisms during a crisis situation. Plan helps to reinforce coordination mechanisms by keeping them active and by clarifying roles and responsibilities before a crisis.

12. Livelihood Security

One cannot speak of disaster preparedness without touching the livelihood issues. "Development is about people and not merely about economic growth captured in macro statistics". The state policy on coastal zones and disaster management must address the concern of the fishing community who can be classified as a marginalized group. Livelihood securities of fishing community need to be placed at the center stage of any meaningful intervention in coastal management.

The traditional fishing sector of Kerala witnessed drastic changes since the beginning of 80's. Modernization of fishing craft through introduction of motorization has resulted in increase in productivity, decrease in fishing time, access to deeper and productive fishing grounds, efficiency of gears and above all greater access to market. A perceptible feature is the increase in capital intensity, which has resulted in increased indebtedness of the fishing community due to increased operational cost. The gap between investment and productivity is a matter of concern. Over dependence on credit and unfavorable capital structure has turned the fishing sector into a crisis area. Pro labor policies of successive Government have not sufficiently addressed the economic viability of small fishing units while the agricultural sector continues to be pampered. Alternative financing institutions must be created to provide soft loans with differential rates of interest to traditional fishermen who have the unavoidable situation of competing with deep-sea trawlers with advantage of high tech innovations in fishing.

Imbalance of exploitable and exploited resource is yet another area of concern. The shift of attention from the issues of "over exploitation" to "over capacity" is a self-realization of the gravity of the problem in fisheries.

Kollam coast has seen a massive increase in fishing fleet since 1980s. The difference between allowable fleet and actual numbers is very huge. Kollam has the distinction of mechanized sector and semi mechanized traditional sector and non motorized sector all operating in the same waters. The conflict between the above has engaged the attention of State Government since 1986. Several commissions have been appointed by Kerala Government to reconcile the divergent interest. Kalawar Committee, Dr. Balakrishnan Committee are just two to cite. Trawling ban has been introduced in the state in the monsoon season. Rules regarding night trawling, shore trawling, permissible gears etc. are either not heeded by stakeholders or not taken seriously by Government.

The words of Dr. Swaminathan throws light on the recurring feuds between traditional and mechanized fishing sectors when he comments, "The fact that development is conflict ridden must be recognized and the role of the State in resolving such conflicts has not been unproblematic".

As far as we are concerned we cannot conceive any viable disaster management intervention without a framework to narrow the gap between two seemingly warring factions in the fishery sector - the mechanized and traditional. Yet another threat to the livelihood security is the intrusion of foreign vessels in our water. The challenge is to bring about reconciliation among various actors in the fishing sector. Seasonality issue is another thorny issue inviting the attention of both Govt. and NGOs. The option of alternative livelihood initiatives has not been explored sufficiently.

Livelihood security of the coastal community must occupy the center stage in any disaster management policy.

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COASTAL MANAGEMENT

Was it fair to attribute the devastation and death of fisher folk and coastal dwellers solely to this natural calamity? Could a proper CRZ, have prevented the loss of life and property?" These were some of the questions raised after tsunami. "There were similar questions about locating dwelling places very near the sea, absence of natural vegetative barriers along the sea front, proper awareness, information and dissemination and the role of local bodies/ community¹⁶." This leads us to a new front to be conquered.

Though almost half of humanity live in proximity to the sea it was only recently that coastal management emerged as a key concern of the global community. The 1990s were observed by United Nations as the International Decade for Natural Disaster Reduction (IDNDR). Prior to that in 1972 the world nations gathering at Stockholm pledged to protect the global environment for the survival of the present and future generations.

Various multilateral and bilateral agencies on coastal management have laid down directives for compliance by Nations. United Nations Conference on Environment and Development recommends Integrated Management and Sustainable Development including EEZ with sustainable use and conservation of living resources and climate change. United Nations Environment Programme (UNEP), Organization of economic co-operation and Development (OECD) and International Union have laid down guidelines for integrated management of coastal areas for conservation of Nature (IUCN). But foremost of all guidelines was that of the colloquium on the environment and Natural Disaster Management by World Bank in 1990. This conference affirmed that all management plans for coastal zones are to be designed with the participation of the concerned populace.

Emphasis of all the International summits boils down to devising an integrated approach with a thrust on sustainable development. Coastal management is to be seen as part of a global strategy for sustainable development. 'Conservation of resources' and 'limitations or prohibitions to development of coastal areas' occupies prime position in the global strategy for coastal management. ICZM is described as the most appropriate process for anticipating and responding to long-term concerns and needs while addressing the present day challenges.

Integrated Coastal Zone Management (ICZM)

"ICZM is a continuous and dynamic process that unites the government and the community, science and management, sectoral and public interests in preparing and implementing an integrated plan for the protection and development of coastal systems and resources. ICZM is a unitary programme and it has to manage development and conserve natural resources and, while doing so it has to integrate the concerns of all relevant sectors of society and of the economy. It is important that coastal economic development be generated for the people of a country, who are powerful. The goal of the ICZM is to improve the quality of life of human

¹⁶ Srikumar
Chattopadhyaya.
Disaster
Management
Lessons from
Tsunami P1

communities who depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems.

Major functions of Integrated Coastal Zone Management

- ❖ Area Planning - plan for present and future uses of coastal and marine areas; provide a long term vision
- ❖ Promotion of Economic Development - promote appropriate uses of coastal and marine areas (e.g. marine aquaculture, eco tourism)
- ❖ Stewardship of Resources - protect the ecological base of coastal and marine areas; Preserve biological diversity; ensure sustainability of uses
- ❖ Protection of Public safety in marine coast typically prone to natural, as well as man-made hazards
- ❖ Proprietorship of public submerged Lands and Waters - as Government's are often outright owners of specific coastal and marine areas, manage government-held areas and resources wisely and with good economic returns to the public¹⁷

Zoning is an important strategy to implement ICZM. Zoning earmarks areas to sustain development and for protection/ prohibition. It can identify areas of concern or those that are vulnerable like areas of coastal erosion. Zoning was a matter of dispute in India before Tsunami. Though the shock of tsunami has ebbed the opposition, it still remains as a bone of contention. Nations are called to fix setback zones for limitations on various activities like Housing, Industries in coastal areas based on geomorphic events, sea erosions and geomorphology of the coast such as rocky cliff, sandy coasts etc.

Vulnerability Mapping has to be done on a regular basis by the State. Something, which sparks dispute, is setback rules of different activities like Housing, Tourism, industries etc. Setback rules should be different for High Risk Zones and Low Risk Zones. Coastal land use, bio shield development, mangrove regeneration, resettlement of people living in high risk areas and strengthening of infrastructure for hazard management are some of the ingredients of a proper management plan.

At the summit in Rio in 1992 a significant effort was made to relate environment to development. The summit declared that environmental regulations should be formulated on the principle that development should be designed to meet the needs of the present without harming the future generations' ability to meet their needs.

The Indian initiatives in Coastal Zone Management dates back to Indian Fishermen Act of 1897. The Act dwelt with issues like coastal erosion, coastal pollution, ports and harbor. In 1981 Smt. Indira Gandhi the Prime Minister of India who had a keen interest in ecology wrote to all the coastal state to take adequate steps for protecting the coastal environment.

According to the constitution amendment of 1976 environmental protection is the fundamental responsibility of the government. Simultaneously it became the bounden duty of all the citizens to protect the rivers, seas, water resources, forests and wild animals. (Fundamental Duties of Citizens) Our constitution seems to observe silence as to whether it is the fundamental right of the citizens or not to have access to unpolluted air, pure water and coastal regions, which are implied

by the word 'environment'. But our honorable Supreme Court in various judgments has decreed that every citizen has the right to have an environment that is conducive to healthy living, because the right to live is a fundamental right.

On finding the existing laws inadequate to maintain the ecological balance and to check the interferences of man detrimental to ecology, the parliament of India passed the 'Ecology Protection Act'. in 1986. Through this comprehensive legislation the central government was empowered to protect the environment, to improve it, to regulate human interference in nature, to prohibit activities leading to environmental pollution and to remedy the evils already caused by human interferences. (3 [1]). Through this legislation the government was empowered to formulate necessary clauses and rules for respective spheres to protect forests, wild animals, air, water and all other spheres related to ecology.

In 1996 the Ministry of Environment & Forests issued the first ever Coastal Regulation Zone Notification aimed at regulating various coastal activities and protecting the coastal environment.

Some of the salient features of this Notification are given below:

- ❖ High tide Line means the line on the land up to, which the highest water line reaches during the spring tide. The High Tide Line shall be demarcated uniformly in all parts of the country by the demarcating authority or authorities so authorized by the Central government, in accordance with the general guidelines issued in this regard
- ❖ Notification has set limitations for setting up fish processing units, industries, mining activities etc. and development activities in coastal areas.
- ❖ For regulating development activities, the coastal stretches within 500 meters of Hide Tide Line on the landward side were classified into four categories or zones.

CRZ I: Areas that is ecologically sensitive such as National Parks, Marine Parks etc. No new construction permitted except projects related to Department of Atomic Energy etc. and infrastructures like schools, hospitals etc.

CRZ II: the areas that have already been developed up to or close to the shoreline. For this purpose, "developed area" is referred to as that area within the municipal limits or in other legally designated urban areas which are already substantially built up and which has been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains.

Buildings shall be permitted only on the landward side of the existing road (or roads approved in the Coastal Zone Management Plan of the area) or on the landward side of existing authorized structures.

CRZ III: Areas that are relatively undisturbed and those which do not belong to either category - I or II. These will include coastal zone in the rural areas (developed and undeveloped) and also areas within Municipal limits or in other legally designated urban areas which are not substantially built up.

The area up to 200 meters from the High Tide Line is to be earmarked as 'No Development Zone'. No construction shall be permitted within this zone except

for repairs of existing authorized structures not exceeding existing FSI, existing plinth area and existing density.

Construction / reconstruction of dwelling units between 200 and 500 meters of the High Tide Line permitted so long as it is within the ambit of traditional rights and customary uses such as existing fishing villages with certain conditions.

CRZ IV: Coastal stretches in the Andaman & Nicobar, Lakshadweep and small islands, except those designated as CRZ - I, CRZ - II or CRZ - III

The Ministry of Environment and Forest has in the last 12 years constituted several committees to address emerging issues and to respond to representatives from States and NGOs. Worth mentioning in this context is Prof. N. Balakrishnan Nair Committee on issues related to Kerala on Coastal Regulation Zone. Among other recommendation this committee suggested reduction of CRZ to 50 m/s along tidal water bodies keeping in view the unique condition of Kerala. Dr. Arcot Ramachandran Committee recommended that the territorial limits should be an integral part of the coastal zone management.

In 2004 the govt. of India constituted an Expert Committee headed by Dr. M.S. Swaminathan to carry out a comprehensive review of the Coastal Regulation Zone Notification 1991. In Feb 2005 the committee submitted an interim Report that may be considered as the basis for policy making and decisive intervention for coastal management. The final report of the committee is yet to be made public. The draft report of the Swaminathan Committee lay down 12 basic guiding principles that should govern decisions on coastal zone management¹⁸.

- (1) Ecological and cultural security, livelihood security and national security should be the cornerstones of an integrated zone management policy.
- (2) The coastal zone will include an area from territorial limits (12 nautical miles), including its sea-bed to the administrative boundaries or the biological boundaries demarcated on the landward side of the sea coast. This area should be taken up for an integrated, cohesive, multi disciplinary and multi sectoral coastal area management and regulatory system.
- (3) Regulation, Education and social mobilization should be the three major components of participatory and sustainable Coastal Zone Management strategy. Panchayathi Raj institution in coastal areas should be fully involved in the educational and social mobilization programmes.
- (4) The protection and sustainable development of the marine and coastal environment and its resources should be in conformity with international law as laid down in 1982 UNCLOS, 1995 Jakarta Mandate etc.
- (5) Coastal regulation needs to be based on sound, scientific and ecological principles and should safeguard both natural and cultural heritage. Areas of environmental significance such as richness of biodiversity is to be protected
- (6) Precautionary approach should be used where there are potential threats of serious or irreversible damage to ecologically fragile critical coastal systems and to living aquatic resources
- (7) Significant or irreversible risks and harm to human health and life, critical coastal systems and resources including cultural and architectural heritage would be considered unacceptable. Ecological economics should underpin economic activities, so that present day interests and future prospects are not antagonistic.

¹⁸ Swaminathan
committee
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- (8) Coastal policy and regulations should be guided by the principles of gender and social equity as well as intra-generational and inter-generational equity, (i.e., the interests of future generations). They should be based on Mahatma Gandhi's dictum, "Nature provides for everyone's needs, but not for everyone's greed". All stakeholders should be involved in decision-making. Precious biological wealth, coming under Marine Biosphere Reserves, should be managed in a Trusteeship mode, with all the stakeholders protecting the unique natural wealth of biosphere reserves as Trustees and not as owners.
- (9) Coastal protection and bio-resources conservation policies should be guided by techno economic efficiency, the precautionary approach, 'polluter-pays' principle(s) and 'public trust' doctrine. There should be strict liability on the part of those engaged in hazardous or inherently dangerous coastal activities, including the liability to compensate the victims of all human made hazards such as marine pollution and fish contamination. They should also bear the cost of restoring the coastal environmental degradation. The onus of proof in such cases should be on the developer/industrialist for demonstrating that their "development" activities are environmentally benign.
- (10) The principles contained in the Biodiversity Act (2002), should be applied to coastal bio-resources management. This will involve concurrent attention to conservation, sustainable use and equitable sharing of benefits. To address the issue of pressures on marine and coastal ecosystems, as defined in the Johannesburg Plan of Implementation (Part IV) adopted at the 2002 World Summit on Sustainable Development, every effort should be made to promote sustainable fisheries, prevent loss of biological diversity, prevent all forms of marine pollution and ensure that coastal area development-urbanization are eco-friendly.
- (11) The regeneration of mangrove wetlands, coral reefs and sea grass beds as well as the promotion of coastal forestry and agro-forestry will confer both short and long term ecological and livelihood benefits. Carbon sequestration through coastal bio-shields will make an important contribution to promoting a balance between carbon emission and absorption, in addition to offering protection during coastal storms and calamities like Tsunami. An important lesson taught by the tsunami disaster is that the rehabilitation of degraded mangrove forests and the raising of coastal plantations of *Salicornia*, casuarinas and appropriate species of halophytes will represent a "win-win" situation both for nature and coastal human habitations. No further time should be lost in initiating a national coastal bio-shield movement along the coasts of the mainland of India as well as islands.
- (12) The several losses of life and livelihoods as well as property caused by Tsunami in Andaman & Nicobar Islands and in the coastal regions of Tamil Nadu, Kerala, Andra Pradesh and Pondicherry teach us that short term commercial interests should not be allowed to undermine the ecological security of our coastal areas. Human memory tends to be short and neglecting the lessons of Tsunami will be equivalent to writing off the future of coastal communities.

Thus Coastal Zone Management requires cohesive, multi disciplinary approaches as well as multi-dimensional vision. Sustainable human security in its entire dimensions-ecological, economic, ethical, cultural and human well-being, in terms of the health and happiness of both man and nature should be the goals of an enlightened Coastal Zone Management Policy (Report of the Swaminathan Committee Chapter 4.4.0).

Swaminathan Committee has placed several recommendations for evolving a scientific coastal management policy. Some of the key recommendations are listed below¹⁹.

- ❖ A holistic approach giving priority to protection and conservation of ecological systems, geomorphic features, water bodies and the vulnerability of the coastal areas to natural hazards is to be initiated. An integrated approach will have to be multi-disciplinary aiming at sustainable management of coastal land and sea area.
- ❖ For addressing the coastal problems in a holistic manner, the water part i.e., the ocean, tidal water bodies should be included.
- ❖ Management approach with due attention to protection and conservation of ecological systems, geomorphic features, water bodies and the vulnerability of the coastal areas to natural hazards should be advanced.
- ❖ An integrated and multi disciplinary approach is necessary.
- ❖ Local democratic initiatives are to be promoted for protecting coastal resources and environment on the principles of common property resources.
- ❖ Area specific plans are to be prepared and regulatory framework is to be put in place
- ❖ Environmental problems in the coast have links with activities in inland areas or in the deep seas. Various resource users have to be linked for conflict resolution.
- ❖ Stakeholder's participation and decentralization of decision-making process and management is to be fostered. Powers must be devolved to the local self-governing bodies in accordance with 74th Constitutional Amendment.
- ❖ MoEF should not entertain any project proposal within the coastal zone for clearance without due public hearing.
- ❖ Local level initiatives are to be supported and specific roles assigned to PRI and organizations of people.
- ❖ Management needs to be oriented towards actually controlling and guiding the development process in a manner that benefits coastal communities in an environmentally sustainable manner.
- ❖ Environmental and social impact assessment should be made mandatory in the approval process of any development projects in the coastal areas.
- ❖ Balance has to be maintained between development and conservation, ie, while it is essential to promote socio-economic development, it is equally essential to maintain the scientific and cultural values of the sites. Environmentally and ethically sustainable development is to be promoted. Principles of ecology, economics and social and gender equity must be respected. Genuine interests of local communities and those of commercial interests must be distinguished.
- ❖ A biodiversity index is to be prepared in coastal areas.
- ❖ Ecological sensitive areas must be demarcated and management plans for preservation must be drawn up.
- ❖ Geomorphic features such as sand dunes, sand bars, coastal cliffs etc. and ecosystems such as coastal forests, corals, bio-shields and mangroves must be respected.
- ❖ A coastal bio-shield movement is to be initiated as speed breakers in the event of hazards. Indigenous species is to be preferred to exotic and invasive alien species.
- ❖ An inventory of sites of cultural, historical and spiritual significance must be maintained in all coastal areas and protection schemes devised.

¹⁹ Swaminathan
Report Page 93

- ❖ Ground water in coastal areas must be declared as social resources.
- ❖ Biological diversity loss, marine pollution etc are to be combated.
- ❖ Conservation of coastal bio resources needs the support of all those who are involved in the sector. Unsafe fishing practices like trawling is to be reviewed.
- ❖ CRZ Notification is to be reviewed, so as to address emerging coastal issues, making it more scientific in its overall approach, keeping in mind both the needs of the coastal communities and the conservation of the coast.
- ❖ Permanent structures within the vulnerable areas are to be prohibited except those required for disaster management.
- ❖ Rural knowledge centers should be established in all the coastal villages with connectivity, digital gateway and capacity building for care and management.
- ❖ Construction of seawalls need to be revisited and the alternative of bio shields and green belts be explored.
- ❖ Vacant plots in the coast should be used as parks, playgrounds etc.
- ❖ Conservation, preservation, restoration and development of coastal resources and ecosystems and livelihood security of coastal people may be considered the cardinal principles of coastal management.
- ❖ Swaminathan Committee has proposed the principle of common property resources and trusteeship as very important in the overall coastal management process.

Some of the recommendations of Swaminathan Committee have come in for criticism from fishermen's unions and NGOs concerned about fisher people. Shift from coastal regulations zones to coastal management zones do pose serious questions "A primary difference in the zoning of CMZ viz-avis CRZ is that restrictions are based on vulnerability to construction to natural disaster rather than the vulnerability of coastal environment to human activity. Best practices followed in USA and Europe may not be ideal for Indian / Kerala coastal situation. Yet another query is to define sustainable development which is the key word in Swaminathan approach. Different Central Govt. Ministries have different parameters to measure sustainable development. Oil exploration, mining, tourism promotion which require shoreline access enjoy exemption from regulations²⁰.

27. Swaminathan committee has defined coastal zone as an area from the territorial water limit (12 nautical miles) including its sea bed up to the land ward boundary of the local self government abutting the sea coast. Coastal Zone also includes inland water bodies influenced by tidal action including its bed and the adjacent land area up to the land ward boundary of the local self government abutting each water bodies.²¹

28. In 2007 the central Ministry of Environment and Forests issued a draft coastal zone management notification which has become the subject of discussion. The proposal is to divide the Indian coast into four sub areas is as follows.

CRZ is to be replaced into CMZ as follows:

- ❖ CMZ 1 - Ecologically sensitive areas such as marine parks, national parks, sanctuaries, mangrove areas, wildlife habitats, heritage areas likely to be inundated by global warming.
- ❖ CMZ 2 - Areas already developed close to or up to the shore line. These developed areas are only those within municipal limits or in other legally designated urban areas which are already substantially built up and which

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²⁰ MCITRA study series XIII.

²¹ Swaminathan Committee Report page 107

have been provided with drainage approach roads and other infrastructural facilities such as water supply and sewer mains.

- ❖ CMZ 3 - Undisturbed areas that do not belong to CMZ 1 or II like coastal zone in rural areas (Developed and Undeveloped) and also municipal and other urban areas which are not substantially built up.
- ❖ CMZ 4 - Coastal stretches in Andaman and Nicobar Islands, the Lakshadweep islands, and other small islands except those designated as CMZ 1, CMZ II, or CMZ III

Swaminathan committee had adopted an approach of demarcating a "set back line" along the coast beyond which development is calculated to be reasonably safe from natural disasters and is therefore permitted". However the MOEF notification removes restrictions on development activities.²²

The main opposition to the draft CZM is that regularity prescriptions of CRZ is removed. "Where the CRZ once protected fisher people and coastal ecology, the new CZM will create a new unregulated coastal zone that will quickly become the exclusive property of resort builders and industrial developers."²³ The draft CZM notification is deemed unacceptable and NGOS and fishermen unions have demanded the withdrawal of notification. If we allow our coast to be stolen by vested interests, we will lose everything it protects as well."

Tsunami came as a wake up call and the Nation woke up to evolve new strategies in coastal protection. In order to provide requisite institutional mechanisms for drawing up and monitoring disaster management plans, the Govt has enacted a new act titled "the Disaster Management Act 2005 (53 of 2005). As provided in the act a National Disaster Management Authority has been set up under the chairmanship of the Prime Minister, a State Disaster Management Authority with the Chief Minister as chairperson and a District Disaster Management Authority under the chairmanship of the District Magistrates. Wide powers have been confirmed in the National and state Govt and district administration to handle disaster. The Act also contemplates the establishment of a National Institute of disaster Management and National Disaster Response Force. The State Govt. is also authorized to legislate acts for disaster management. A national plan for prevention of disasters and for mitigation measures are to be set in place by the National Authority for disaster Management. In the same pattern there is to be state level and district level disaster management plan.

The Act while dealing with the powers and functions of District Disaster Management Authority among other things states that the District Authority "shall ensure that the non-governmental organizations carry out their activities in an equitable and non-discriminatory manner."

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²² MCITRA
Study Series XIII
²³ Ibid

CMFRI Census

1 Population Structure

Kollam District	No. of Families Fishermen	Male		Female		Total	Family Size
		Adult	Children	Adult	Children		
	11899	15570	6030	16032	5578	43210	3.63
(Kerala Total)	120486	213773	90535	213319	84607	602234	5

2 Education status

Kollam District	Primary	Secondary	Above secondary	Not educated	Total
	11667	16832	6025	8686	43210
Kerala total	171470	218704	48493	163567	602234

3 Active Fisher Folk

Kollam district	Full time	Part time	Occasional	Total	Fisher folk population
	8255	201	209	8665	43210
Kerala total	124103	10488	5631	140222	602234

4 Occupation profile

No. of members involved in fishing allied activities

	Active Fishermen	Marketing of fish	Making/ repairing of net	Curing/ processing	Peeling	Labors	Others	Total	Other than fishing	Total occupied	Fisher folk population
Kollam District	8665	1072	607	318	190	375	3953	6515	1166	16346	43210
Kerala Total	140222	17976	9560	3881	8057	17242	14358	71074	13310	224606	602234

5 Religion of Fisher folk

	Hinduism	Islam	Christianity	Total	SC/ST
Kollam	4936	645	6318	11899	110
Kerala total	37022	32400	51064	120486	1833

6 Fishing Craft

	Mechanized	Motorized	Non motorized
Kollam District	1272	605	425
Kerala total	5504	14151	9522

7 Ownership of craft by Fisher folk

Only 402 mechanized craft are owned by fisher folk in Kollam while the state total in this respect is 1374. In the case of motorized craft only 482 craft are owned by fisher folk in Kollam district while the state total in this respect is 8436. In the case of non motorized craft, fisher folk owned craft are only 1282 while the state total is 19173.

Marine fisheries census - 2005

Part - III (6) Kerala

Central Marine Fisheries Research Institute, Cochin

THE STORY OF THE 'BLACK SAND'

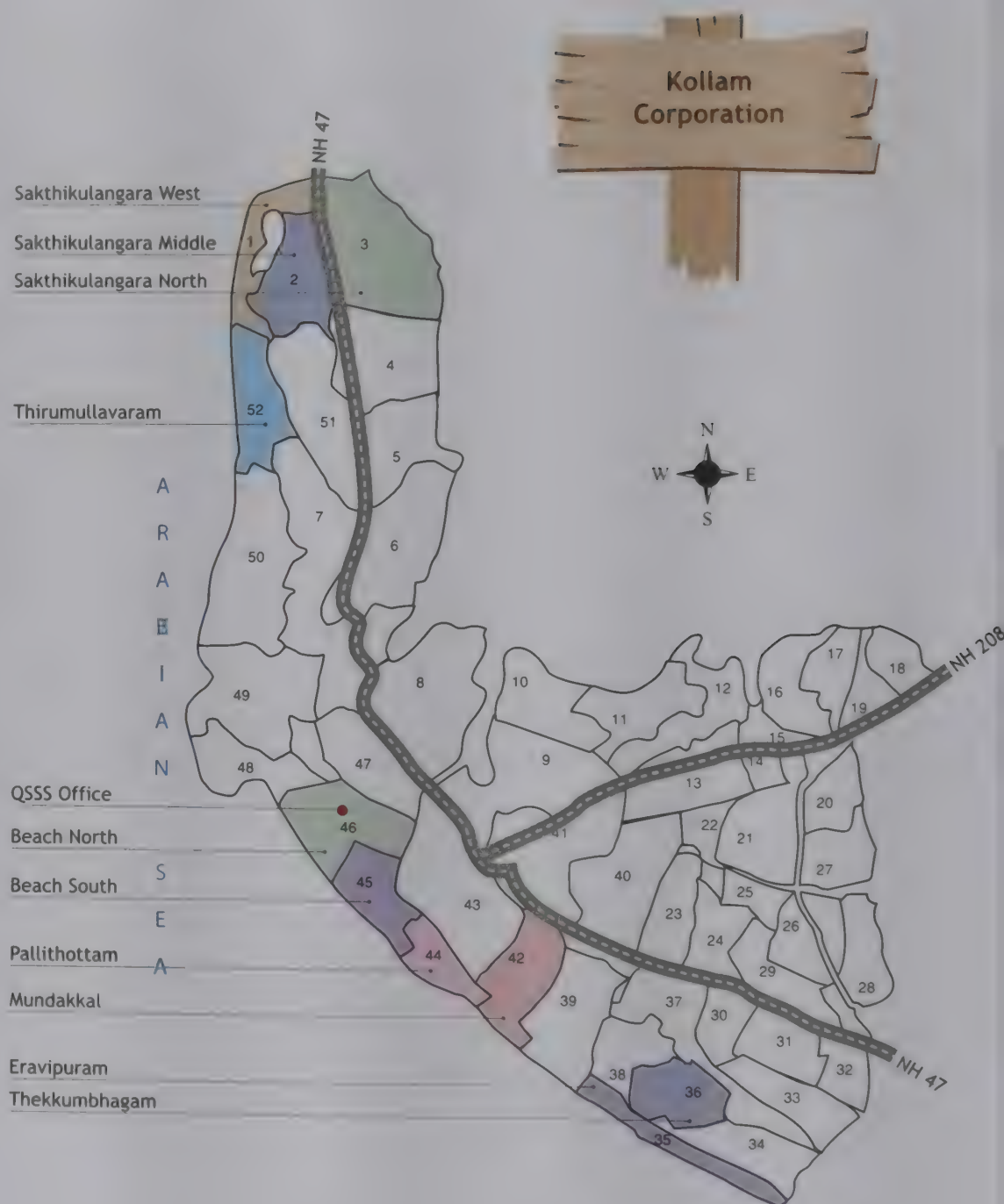
The 22.54 kms. long coastal area extending from the estuary at Neendakara to Kayamkulam Lake is the coastal belt that has the greatest mineral deposit in the world. About 1000 acres of land here has mineral deposits. For the last fifty years mineral mining has been going on in this strip of land, which has an average width of 200 m. The largest deposit of Titanium in the world is in this coast. Minerals like Monazite, Ilmenite and Rutile are found here. This area has been divided into eight blocks and has been earmarked for mining to Indian Rare Earth, working under the Government of India and Kerala Minerals and Metals, under the Government of Kerala. There is 188 billion ton mineral deposit here. The relationship between mineral mining and coastal ecology is a subject that gives rise to much dispute. The people maintain that mineral mining is the reason for the intensity of sea erosion every year in Neendakara, Chavara, Panmana and Alappad. The Swaminathan Committee too holds the same view. "Sand mining is the foremost factor leading to erosion of beaches."- (4.1.3.XV)

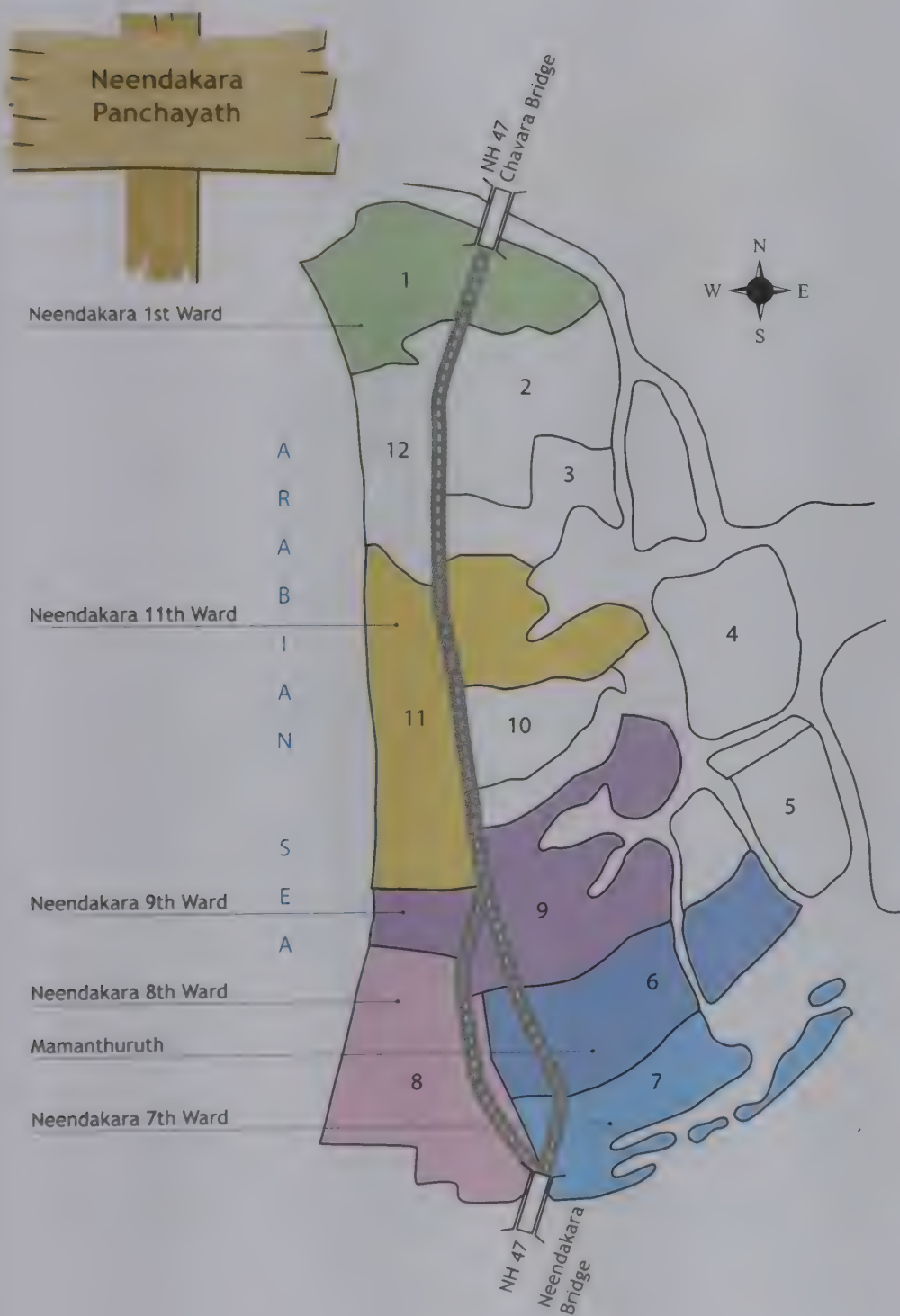
In 1998 it was decided that private sector could also be granted permission to engage in mining activities. But the decision is kept in abeyance because of strong popular protest. According to the Coastal Management Act of 1991 Projects with investment of more than 10 lakhs require the sanction of the Ministry for Ecology. None can discard the ecological problems that will arise when more companies do mining in this region lying between the sea and the canal. This subject is kept under cover, without unraveling the secret unwritten understanding between big industrialists and political parties.

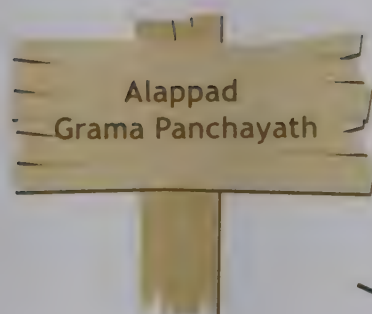
Kovilthottam beach in Chavara GP is a relatively small coast of 25 acres inhabited by 480 families. Kerala Minerals and Metals the Public Limited Company under the state govt. is engaged in mining in this area. Sea washing resorted to by KMML for mining over the years has aggravated the sea erosion in the area. KMML and the Govt. of Kerala not only ignore their responsibility to protect the coast but uses sea erosion as a ploy to drive away the people from the area. Already 113 families have surrendered their land to the company. Instead of offering a respectable rehabilitation package the State Govt. is trying to drive away the remaining 377 families with a paltry compensation.

For the last few years there has been discussion in the political field about a project for mining sand from the sea. The project was to mine sand from the sea about 20 kms. away from the shore up to a depth of 100mts. The sand thus mined would be pumped to the shore. It could be purified and used for construction purposes. Both fishermen's unions and environmentalists protested and the project was dropped.

Annexure 4







Azheekal Ward 1

Azheekal Ward 2

Azheekal Ward 3

Azheekal Ward 4

Azheekal Ward 5

Srayikkadu Ward 6

Parayakadadu Ward 7

Kuzhithura Ward 8

Alappad Ward 9

Cheriyazheekal Ward 10

Cheriyazheekal Ward 11

Cheriyazheekal Ward 12

Pandarathuruthu Ward 13

Pandarathuruthu Ward 14

Vellanthuruthu Ward 15

Vellanthuruthu
Azheekal Road

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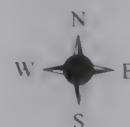
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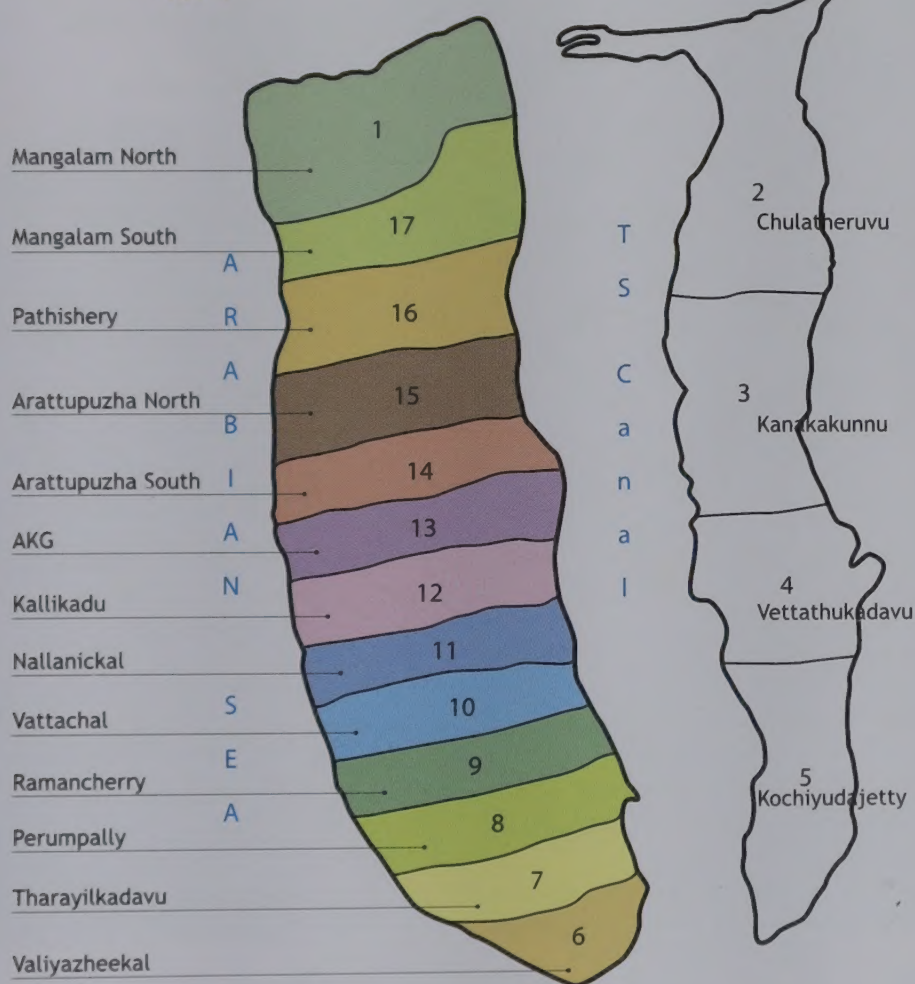
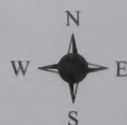
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KEY FINDINGS OF THE SURVEY

- ❖ 10904 families reside in the disaster prone area.
- ❖ 52518 people reside in this area.
- ❖ 6873 children below ten reside here, 5975 of the residents are above fifty five.
- ❖ Above 90% of the people here have had at least primary education.
- ❖ The majority of the people in the coastal area depend chiefly on fishing and other associated employment for their livelihood.
- ❖ 199 have various health problems.
- ❖ 89% stay in their own houses.
- ❖ 65% of the families had settled permanently here before ten years.
- ❖ 71% of the families here have plots of ten and below ten cents.
- ❖ 819 families have own plots elsewhere (Other than where they stay).
- ❖ 71% have latrines of their own. But 3166 families depend on other means for nature calls.
- ❖ Of the existing latrines 50% are useless.
- ❖ 62% of the families depend on the hydrants of the Kerala Water Authority for potable water.
- ❖ Of 10904 families here 57% live just 50 m away from the sea.
- ❖ 90% of those who reside here do so because they have no alternative. Staying close to the coast makes it more convenient for them to go for fishing.
- ❖ 85% of the houses are electrified.
- ❖ Only 2% of the people come to know the news through the print media.
- ❖ 29% of the people stay in huts. 38% of the houses here are concrete structures. 54% of the houses are constructed using cement bricks.
- ❖ Only 29% of the people do proper disposal of solid waste materials. The remaining 71% play an important role in causing environmental problems.
- ❖ 9% do the disposal of fluid waste materials by letting them out into canals and streams, this pollutes the canals and streams and cause health hazards.
- ❖ 95% of the people are aware of the possibilities of disasters.
- ❖ The people here face many problems related to health, economic conditions, environment, education, rehabilitation and basic amenities.

Contributed by ★★★★★
Mandhan
18/05/2015

Glances





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